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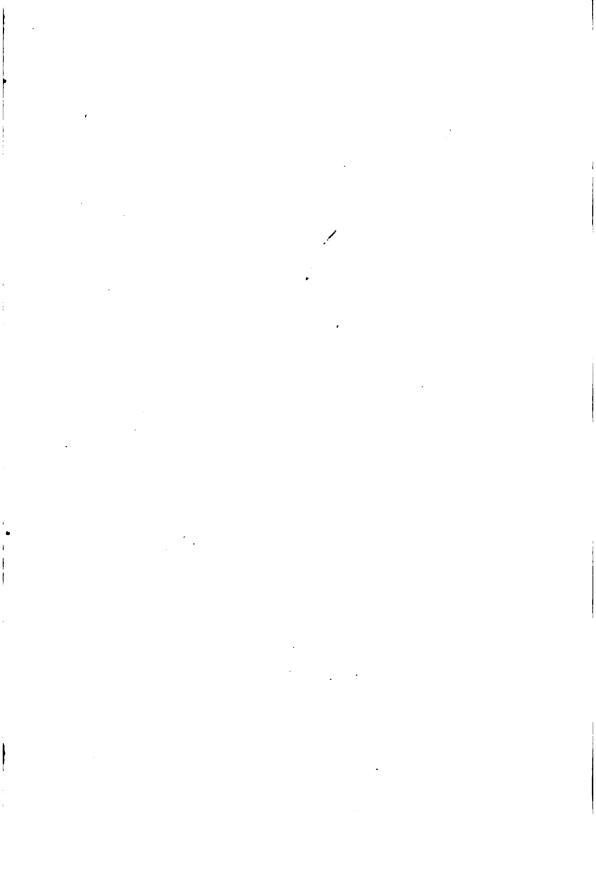
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# PICTURED KNOWLEDGE

Visual Instruction Practically Applied for the Home and School

VOL. I

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Commissioner of Education of the State of New Jersey

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Author of "The How and Why Library," "Greyfriar's Bobby," "Johnny Appleseed," "The Boyhood of Lincoln"

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E can now travel in any land, in any season, or among any tribe or race, snugly ensconced, with a few illustrated books, by our own fire-place. The limit and range of what pictures can do is steadily increasing. One can know many

of the wonders of the vast new world of the microscope and telescope without ever looking through an eye glass. It would be a curious question for the imaginative mind to work out how far an education based upon a wise selection and proper gradation of pictures might today be carried without the ability to read. If all written or printed records of the present time should be lost it is surprising to reflect how much of what makes life interesting could be reproduced by pictures alone. Seeing is not only believing, but understanding, and a single judicious picture or blackboard drawing often tells in a moment what it would take paragraphs to describe, if indeed words could ever give it at all.

G. STANLEY HALL

# What Is "Pictured Knowledge?"

HE names of the editors and contributors are sufficient evidence of the importance of this work, and a mere glance through its pages will show that it marks a distinct development in educational methods.

#### The Parent's Problem

No parent needs to be told that children are constantly asking questions about things in their school

work that are not plain to them. Yet parents find it difficult to explain these things from the child's standpoint.

Unless these questions are answered, the child's naturally keen interest in the things worth knowing is destroyed. He not only makes little progress in school, but school becomes distasteful, and statistics show that a large percentage of children drop out altogether. They enter the struggle of life under the great handicap of an insufficient education, and they have neither the taste nor the ability for the mental application which is more and more requisite to success in this age of specialization.

# Making School Work Attractive

In view of these facts not only educators but business men everywhere have felt that something should be done to capture the child's interest and to make the school work more attractive and more profitable.

The old idea of education, as a prominent educator has said, was simply to "fill the child's mind full of an enormous mass of unrelated facts." Many people, both inside and outside the school, also labored under the delusion about "mental discipline." "I don't care what ye tache thim," says Mr. Dooley, "so long as 'tis onpleasant to thim!" recalling a similar idea in the old school of medicine that no prescription could accomplish the best results "onless it choked ye goin' down!"

#### The New Idea in Education

The new idea in education is that it shall consist of the essential, useful things logically related, and so presented as to be attractive to the child, to make him think and to keep his curiosity alive. Not only is curiosity the appetite of the mind, but without it there is inevitable indigestion. Teaching which does not keep the child curious and interested leaves a bad taste in the mouth; he comes to have an indifference, or a positive dislike, for school and everything connected with it.

It is the new idea of education that is carried out in PICTURED KNOWLEDGE. The important things in each subject have been selected, and by the use of visual instruction and the art of the story-teller a plan has been developed which makes school work more interesting and more profitable than either the teachers or the text books are able to make it without such aid.

#### Pictures as Realities

"Whenever," says Dr. Stanley Hall, "we can substitute a picture for mere words, the concrete for the abstract, we are doing a real work of mental economy of great value in this age of strain and fag of brain and nerve."

Dr. Martin's description of the reproduction of Moran's "Chasm of the Colorado" in the article on the national parks, is a striking example of this use of pictures as substitutes for realities for those who can not visit the scene, and it will serve as a most valuable guide to observation and a vivid memory for those who can. Such a combination of pictorial illustration, with graphic description, will be found a characteristic of the work throughout, and, particularly to the vivid imagination of a child, it constitutes an experience rather than a description.

## Use of Imagery by the Great Teacher

Practically all the talks of the Great Teacher were pictorial; they were either suggested by concrete things or were illustrated by word pictures. To the fishermen He illustrated the nature of His mission by the nets they were then casting into the sea. The parables are great moral truths in the form of living pictures presented to the mind. The abstract idea of the religious conversion of the world was translated into picture language: "Follow me and I will make you fishers of men."

No less notable is the fact that the great poets,—Homer, Virgil, Dante, Goethe, Shakespeare,—are given rank largely according to their pictorial imagination, their skill in composition, the vividness of their imagery.

# Education as "Image Growth"

While in one sense Visual Instruction is a phase of education, it in reality embraces almost the whole of the educational process when properly combined with words. So widely has this truth come to be recognized that education has been defined as "image growth."

In our stories of Geography—"Seeing the World and Its Peoples"—picture travel becomes almost as real to the child as actual travel.

It is because PICTURED KNOWLEDGE deals with the same subjects as the text books, but in a way to give life and purpose to them, that its function is so important. Dr. Weiner, of Harvard, who made it a practice to answer his boy's questions and then feed him with suggestions for more questions in the family conversations and in walks along the roads and in the woods, accomplished what seemed remarkable results, but he points out that similar results can be accomplished by other parents who will do a similar thing.

#### The Wonderful Six Years

One of the most thoughtful writers on education, and himself one of the greatest of teachers, Colonel Parker, calls attention to the fact that a child masters more of the school subjects, including the difficult subject of Language. during the first six years of his life—that is to say, before he goes to school at all—than he ever does in twice that time after his school life has begun. This is because he is learning with his eyes and because during that period his mother is his teacher. In the frequent criticism of our public schools the assumption is made that the trouble is with the schools themselves; but the chief difficulty is that so many

parents lose educational connection with their children after they start to school. What parents should do is to keep up interest in the education of their children and talk with them on the various topics that come up in the school branches. Talk with them not alone about the marks they get, but more, and principally, about the subjects to which the school texts relate. They are the most worth while as well as the most interesting subjects of conversation in the world, if you will only make them so.

## The Parent and the Text Book

By clothing the dry bones of the text book with living flesh and blood, by supplying, in pictures and in graphic words, life, color and motion to these catalogs of facts which to the child seem too dry, dreary, dead and pedantic, PICTURED KNOWLEDGE restores the connection between education and the home by a process at once easy, natural and delightful.

Every mother knows from her experience with her own children that if this has really been accomplished in these pages her children are certain to do better work and to advance much further and faster than they otherwise would.

# How Difficult Subjects Are Made Plain

Just to illustrate how the plan has been worked out let us take one of the most confusing and difficult subjects with which children have to deal in the study of Geography—what in scientific language is called Meteorology, the science of the weather. The mystery of the weather has appealed to men in all ages, and the use of the neuter pronoun in common reference to the weather—"It's going to rain," "It's growing cold," is an expression of the general lack of knowledge of the real causes of weather phenomena. Not knowing these causes, people simply called them "It."

Yet by means of the title illustration alone, in this article, is given, in a way that makes the subject as attractive as the puzzle page in the child's story paper, not only the history of men's ideas about the weather, but the most fundamental facts in the science of the subject and the various scientific instruments employed in weather prediction—the rain and thunder gods of the ancients, the fact that all winds are cyclonic, how the weather man "sees with a hundred eyes" and makes up his predictions, and so on.

Franklin's discovery of the principle of wind and weather movement is the most important in the whole history of the science, and the text books contain many pages of dry diagrams and drier analysis to explain it. Yet, see how simply the whole idea is summed up in the picture of the little wind sprites blowing in a circle, and the accompanying comparison in the text of the wind movement to "happy children dancing."

## A Book for All Ages

We all studied weather in school and memorized phrases about the trade winds, which we neither understood nor remembered, simply because the subject was not made plain and interesting. Even the high school boy who is plodding through his "meteorology"—not to speak of the average adult—will get more information about the weather and the modern method of weather prediction in this short article than he has acquired in all his previous reading or study on the subject.

So with the whole range of school subjects—Nature Study in the story of the bees and the "bee line," the ants, the coffer fish with his "Hallowe'en face," the crab and "the boarder who lives on the roof," and other and wonderful and interesting things in the plant and animal world; Geography in the travel stories of the world and its peoples, the great industries, the great inventions, Astronomy, Civics, as represented in the articles on the navy and the postoffice; Biography in "The World Helpers."

In short PICTURED KNOWLEDGE is quite as much a work for adults as for children. It deals with just those topics of permanent and universal interest which cultivated people are supposed to know and which it is always embarrassing not to know.

## Acknowledgments

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THE STUDY OF GEOGRAPHY

# The Child and His World

Purpose and Method of Modern Geography Teaching in Home and School

THE for Geogratil the fourth

y reached all ught together concept of the

preparation for that study. In its broadest sense Geography em
Geography braces all the natural sciences and the practical activities of men.

It has to do with land, water and

tical activities of men.

It has to do with land, water and climate; minerals, plants and animals; industry, trade and government.

# The Child's First Steps in Geography

The child of ten brings to this study a knowledge of his environment through Home Geography. Travel stories and pictures have introduced him to strange lands and peoples. Accounts of primitive races and biographical stories have given him ideas of human progress, and of widely varying degrees of present day civiliza-Our "Typical Industries" tion. show the world at work under various conditions. Through our "Soldiers of Peace" the child has glimpses of government in action. When the formal study of Geobig, round world and its busy people, as a whole.

To this end Geography as a school study is chiefly descriptive. It is a presentation of the earth's surface as the home of man; the earth's useful contents and what man is doing with them. Modern Modern Ideas teaching attaches less About the importance than of Use of Maps old to political divisions, since the world has come to be bound so closely together by news, travel and trade. Maps are no longer crowded with the names of places to which no one ever goes, nor the text with useless in-But the large and formation. lasting facts are emphasized. For instance, the exact population of a city is unimportant and subject to change. But the natural advantage which caused the location of a city, and which makes it continue to grow, is a permanent and important fact.

# Why North America Is Studied First

Of the six great land masses, North America is studied first for several reasons. It is our home, and to it the child brings the greatest interest and knowledge. "The importance of teaching this first continent clearly and completely, cannot be overestimated," says the famous educator, Francis W. Parker, "for upon that is based all of a What Francis child's future progress in Parker Said geographical knowledge." And also, let us add, his intelligent interest in its various aspects-scientific, physical, commercial and political. It is obvious that his success and pleasure in life must be based upon those interests.

No other continent presents such a wide variation of climate, and such a wealth of natural resources put to the highest uses by advanced and energetic people, together with so simple a structure and with so many clearly the World with so many clearly types, as North America.

It has an enormous length of shore line with fine harbors, great and varied mountain and river systems, the largest fertile river valley in any temperate part of the world, deserts, frigid and tropic regions, waterfalls, volcanoes and glaciers.

# Giving Life and Color to the Text Books

From lack of space the school text books cannot do much more than record important facts and give an orderly series of lessons, maps and illustrations. Teachers supply an incredible amount of color and detail from their own knowledge, and refer the children to other sources. what is wanted on any one topic is scattered through many books, and hard for little people to find and piece together. The following series of studies brings such supplementary matters together from many sources. It amplifies the text in every direction, presents vivid pictures, and explains the causes of local conditions in every part of the world. It is intended to help the child Home, Workshop, build up a living image, Playground and get a sympathetic understanding of the big, round, beautiful earth that is the home, the workshop and the playground of so many millions of differing peoples.

THE EDITORS.

# The World in Miniature

Yon stream, whose sources run, Turned by a pebble's edge, Is Athabasca, rolling towards the sun Through the cleft mountain ledge.

The slender rill had strayed,
But for the slanting stone,
To evening's ocean, with the tangled braid
Of foam-flecked Oregon.

-HOLMES

## TEACHERS COLLEGE COLUMBIA UNIVERSITY

To the Readers of Pictured Sundage:

Geography as a school subject has wonderfully changed its character in the last trouty years. It would be character in the last trouty years. It would be consist of a description of the earth's surface and the location consist of a description of the earth's surface and the Earth and of places; and it gam the surpression that both the Earth and the things upon it always broked much as they sum do, bush the things upon described much as they have necessarily superficial, calling chiefly for exercise of study was necessarily superficial, calling succh of it.

Regle over forty years of age would hardly recognize from the complete over forty years of age would hardly recognize from

People our forty years of age would harly recognize freeent geography as akin his what they had, as children, underthat mane. It would deals, first; with the home environment, show ing how the boil was produced, the hills and volleys formed and certain industries diveloped there. Then it explains why the difcertain industries diveloped there. Then it explains why the different faits of the earth ham the weather they do; how the great overfolime have arress in the leading countries, and why

They very in importance here and there. Where formuly it were mainly description, it is now could dealing with principles as the relavors. and where formuly it taked chiefly memory, it now regimes full thunking from. Of course it is for more interesting one profitable than it was to be.

Bol. Francis Parker, probably our most decliquished leacher of a generation ago, was a lealer in ground to geography its new dignity. He realized not only that it could have a very nich content, but about that it might furnish the basis for suuch history, lettrature, nature study and science For these reasons, in the Practice Department of his Training School in Chicago, he made it, to a large extent, the central slidy for the entire curriculum his example, in this respect, has had great in fluence throughed the

country any on now, who even gretured to an education, must have studied geography extensively. The leading purpose of travel is a fuller knowledge of that field. Out whether on travels with this purpose or not, much study of maps and other par-

graphical facts is necessary, as a condition of comfort and other profet. Nearly everholy greatly needs geography in live ways. The first concerns own life work There are seven great occupations in the world, namely, agreculture, lumbering, fishing, mining, manufacturing, transporting, and trade. Leography tells whose about these occupations than does any other colon study; and since most people are engaged in some one of these lines, each person should have a good humbely of this Subject. Each person should be well acquainted with it for free-tend reasons, also temperes are constantly referring to countries. while, and geographical condition. It is striking him ma magazine articles deal with geography. Naturally, then, such top. ice are frequent subjects of conversation in social getherings. any one, therefore, who neglists this line of experience, is sure to lack willigence in his reading and enversation, and to ful embarrassed in consequence. He ought to feel so. In these limes the may hold - is as important as the disturby hold, a fact which, done, shows the firmmer of geography in daily by. Frank M. M. Wenry

#### The Meaning of Geography

To the Readers of Pictured Knowledge:

Geography as a school subject has wonderfully changed its character in the last twenty years. It used to consist of a description of the earth's surface and the location of places; and it gave the impression that both the earth and the things upon it always looked much as they now do. Such study was necessarily superficial, calling chiefly for exercise of memory, and there was little reason for doing much of it.

#### Training the Reasoning Faculty

People over forty years of age would hardly recognize present geography as akin to what they had as children, under that name. It usually deals, first, with the home environment, showing how the soil was produced, the hills and valleys formed, and certain industries developed there. Then it explains why the different parts of the earth have the weather they do; how the great occupations have arisen in the leading countries and why they vary in importance here and there.

Where formerly it was mainly descriptive, it is now causal, dealing with principles as the reasons. And where formerly it taxed chiefly memory, it now requires full thinking power. Of course, it is far more interesting and profitable than it used to be.

#### Geography as a Central Study

Colonel Francis Parker, probably our most distinguished teacher of a generation ago, was a leader in giving to geography its new dignity. He realized not only that it could have a very rich content, but also that it might furnish the basis for much history, literature, nature study and science. For these reasons, in the Practice Department of his Training School in Chicago, he made it, to a

large extent, the central study for the entire curriculum. His example, in this respect, has had great influence throughout the country.

#### Geography, Travel and the Industries

Any one now, who even pretends to an education, must have studied geography extensively. The leading purpose of travel is a fuller knowledge of that field. And whether one travels with this purpose or not, much study of maps and other geographical facts is necessary, as a condition of comfort and other profit.

Nearly everybody greatly needs geography in two ways. The first concerns one's life work. There are seven great occupations in the world, namely, agriculture, lumbering, fishing, mining, manufacturing, transporting and trade. Geography tells more about these occupations than does any other common study; and since most people are engaged in some one of these lines, each person should have a good knowledge of this subject.

#### Geography and General Culture

Each person should be well acquainted with it for practical reasons, also. Newspapers are constantly referring to countries, cities and geographical conditions. It is striking how many magazine articles deal with geography. Naturally, then, such topics are frequent subjects of conversation in social gatherings. Any one, therefore, who neglects this line of experience, is sure to lack intelligence in his reading and conversation, and to feel embarrassed in consequence. He ought to feel so. In these times the map habit is as important as the dictionary habit, a fact which, alone, shows the prominence of geography in daily life.

FRANK M. MCMURRY

#### SEEING THE WORLD AND ITS PEOPLES

# The Earth as a Picture Book

Have you got your first Geography? What fun you will have with it! Geography means earth pictures. If you go to a picnic a

mile from home you see new pictures. But unless you have time and money to travel long and far, you cannot see distant lands, nor more than a small part of our own dear America. It takes four days to cross America from east to west, on fast trains.

So, isn't it lucky that we have a stay-at-home travel and picture book! The Geography shows the places, shapes and sizes of the large bodies of land, and the wide oceans that roll between and around them. It tells you how to go from one country to another, and takes you to see Stay-at-Home all the interesting Travel places and people. It never becomes tiresome. Our big, round, beautiful world has only land, water and weather, plants, animals and people, but out of these few things it makes countless pictures. It's as full of delightful surprises as a Christmas stocking.

It makes mountains so high

Mother they wear their snow

Caps all summer, rivers miles wide, rocky

gorges a mile deep, waterfalls

that seem to tumble from the

clouds, sandy ocean beaches big enough for hundreds of people to go swimming at once, broad deserts, prairies that are billowy seas of

grass and flowers, and whole mountain slopes of forest trees. All of these and many other grand and beautiful things can be seen in our country.

Some things will astonish you—natural fountains of boiling water,

And Such mountain peaks that smoke like chimneys,

Things Too! and rivers of ice that have not melted in thousands of years.

Then there are the stories of plant and animal life. We explain many kinds of work that men do in fields, factories and We tell how our own mines. country is governed, and how faraway people look and live. You see, we knew you would come upon many interesting things on this Geography round-the-The World at Its world journey that Work you would want to know more about. We could not stop to explain them, so we put such things as coal mines, camel caravans and fishing fleets in separate stories. What do you want to see first? Our own country? That's right. So: All aboard for America! And keep your eyes open.



# AND ITS PEOPLES

NORTH AMERICA

# We Discover America

D Taber-Prang Art Co.

It took Columbus many weeks to cross that ocean, and it was a happy day when a tired little sea bird came aboard his flagship to rest. Such birds nest on shore and never fly many miles out to sea. So they tell the sailor land is near.

HOW would you like to pretend you were with Columbus when he discovered America? Then you need not be ashamed of knowing so little You Were about the big body Columbus of land on which you live. Columbus did not even know America was here. He just bumped into it when he was trying to find a new way to India

and China. Still he knew a great deal about Geography.

#### What a Little Bird Told Columbus

The Atlantic Ocean, that lies east of America, is only three thousand miles wide. Big steamers cross it in five or six days. But it took Columbus as many weeks to cross that ocean in his funny little tubs of sailing ves-

### ■ PICTURED KNOWLEDGE ■

ppy day when
rd came aboard
When he saw
t land was near.
pirds are often
sign of the nearland in every
They nest on
many miles out
to come to meet
saw what looked

float ships, whi protect them fr The harbors t early explorers

Where seal Great Cities tod. Grow Up for of the world. vana, which is Harbor'—is it Indies Islands

## Fine Land-Locked Hark

of North or South America. Wherever they went they looked for harbors.

#### Many Shores of Many Forms

How they hunted for these safe places for ships! But along some shores harbors were as scarce as robins in January. Around the Gulf of Mexico, the peninsula of Florida, and far up the eastern shore, the coast was low and flat. The mouths of most of the rivers were choked with sand and mud. Long sandy islands had been piled up near the shore by the Find These Three Bays waves. In the middle of the east coast, three great bays pushed in from the ocean, and deep rivers flowed into them, making harbors. Farther north were many big and little bays, and rivers reached the ocean through sunken valleys, making other fine harbors.

Through the Gulf of St. Lawrence the ships sailed inland for a thousand miles, up a noble river that got its water from the Great Lakes. North of that lay the half frozen peninsula of Labrador. Explorers beat their way past its rock cliffs and through storm and fog and ice to the inland sea of Hudson Bay.

#### A Bit of Good Luck

You can see that our western coast is straighter than the eastern, and with fewer bavs Crooked and river mouths for Coasts and Straight harbors. It is fortunate Sailing that our best coast was on the east. The white people lived just across the narrow Atlantic ocean from it. The English, Spanish, Dutch, French and Portuguese were the ship builders and traders of the world. Our western shores fronted an ocean twice as wide; and the stay-at-home yellow and brown races lived on the other side of it. These people trade with us today, and now there are many ships on the Pacific ocean.

North America lies between two big oceans on which ships steam and sail. A third great Last of All, A mundsen frozen ocean joins them on the north, for the waters of the earth are all connected. The warm sea of the Gulf of Mexico cuts half way across the southern end of our continent. What an enormous, irregular coast line! It took many men four hundred years to map our shores. The man who finished the task among the frozen islands along our extreme north coast was the brave Norwegian explorer, Roald Amundsen.

#### Every Map a Story of Adventure

You did not know maps were made in that way? The first ones had to be. Bold sailors poked the noses of their vessels into every little bend of our shores. They named the capes, peninsulas and islands, the rivers and bays. They were very careful to mark the good harbors, so that these places where ships could come and go could be found by the people who would want to come to America to make new homes.

Maps are puzzling and hard to draw, but you would be ashamed to complain about that when you think of the brave men who first made Besides, they help you see them. and understand earth pictures. Flat outline maps show only Languages the Maps forms and places. They Talk are just plans of lands Colored maps are and waters. meant to show how a big continent

# The Catskills Seen Through a

it wore away it filled the lowlands as its bases, building out the coastal

plain, and raising the level of the central vallev to the Mississippi.

From the western bank of river the land b Across swampy prairies it rises

less plain that l. ........ That is higher than all but a few peaks of the Eastern high-And from this high plain the lofty, broken ranges of the Rocky Mountains spring like a wall, two miles higher. On your relief map, that mountain wall looks like a backbone to the continent, rears a great crest north and south from the Arctic Ocean to Central America. These are younger mountains than those of the East-that is they were lifted much later. Their peaks are high and jagged. Many of them are snow covered, even in summer.

West of these great ranges, uplifted lands fill the western third of the continent, in its broad parts, and the entire narrowed southern end, between the Pacific ocean and the Gulf of Mexico. Separate ranges and knots of mountains are scattered over a high, semi-desert plain. Big rivers rise among snowy peaks far inland, but few branches join them and they do not water To west and south wide valleys. and east they cut deep gorges or canyons to the sea, or to the Mississippi in the central valley.

The western edge of these highlands is bordered by still newer ranges of mountains, with spurred

water parting for the continent. As ridges, sharp snow peaks three miles high, and old volcanoes, or These ranges smoking mountains.

> fall to lovely watered valleys that are shut in, on the west, by lower coast ranges. Then drops down a slope into deep hlands have not enough to have built out a wide

continental shelf. There are few sand beaches. There are good harbors only where rivers have broken through water gaps, or the ocean has cut bays into the land.

### America's Three Water Partings and Six Slopes

The eastern and western highlands make two great water partings and four slopes. The two short slopes fall toward the occans. The two long ones meet in the central valley.

There is still another water parting, making two more slopes. Find the little beginnings of the Mississippi River west of the Great Lakes. That river flows south. The Great Lakes flow east into the St. Lawrence. Tust above these two, a net work of little lakes and streams form the Nelson River that runs northeast into Hudson Bay. Mackenzie River rises on the east slope of the Rockies. But when it reaches the region above all these streams, it turns north into the Arctic ocean.

All about the heads of these rivers the land is so low that much water lies in marshes and strings of little lakes. Still, there is a rise, a broad, low, broken range of hills, all that is left of a poor, old, worn-

It is called out mountain system. the Laurentian Highlands. You can trace it, by the way the streams run, and by little, bordering lakes eastward to Labrador, between Hudson Bay and the St. Lawrence

River. West of the Bay it turns north to Great Bear Lake. This makes a long, bent hilly region raised high enough for a water parting. From it the land slopes north to the Arctic Ocean and Hudson Bay and south to the Gulf of Mexico.

The highlands slope south, too. The Appalachian highlands fall to they reach the Gulf. Lower and lower the crest of the Rockies, the table-land behind it and the coast of the coast of the coast of the Rockies and behind it and the coast of the coast of the coast of the Rockies and behind it and the coast of the coast hills long before

ranges sink, from Central Mexico to the rough hills of Panama, that lucky ! That isthmus is less than fifty miles wide, but if the mountains had been high there we never could have cut that canal across it.

#### How America Came Up Out of the Sea

If you have read the story of the land you know that all land was once under the sea. America has risen and sunk a number of times. Finally some lands were able to stay above water. Which parts that are now above the sea, do you suppose appeared first ? Why those old Laurentian Highlands, of course.

They came up as a long, curving chain of islands resting on a drowned table-land. That was lifted and the land was pushed up and folded into ranges and peaks. Next the Eastern highlands appeared in

Apples, People and the Earth Wrinkle the same way and, when They Get Old

long afterward, the Western, with two thousand miles of ocean between them. The Gulf of Mexico flowed right through to the Arctic Ocean.

Very slowly the central valley was lifted and filled in, and the coastal plains and continental shelf built Our newest. western coast still rising, the older eastern coast sinking, very

### Weather and Climate

The size of a

continent, its mountains, plains and inland waters all have much to do with its climate. Read our story of "The Wind and the Weather." Most of our winds come from the west. The water that they pick up in the Pacific Ocean is dropped on the coast ranges and valleys in rain, and on the higher mountain peaks in snow. There is little moisture for the tablelands, the Rockies and the plains east of them. The winds are cooled by the mountains they blow over, and they gather speed in sliding down the long slope into the central valley. They pick up more moisture in the Gulf of Mexico and the Great Lakes

to water the eastern half of the continent. The winds blow right over the low, eastern highlands to the coast.

If the low mountains were on the Western instead of the Eastern coast there would be a different weather story to tell. And if those Laurentian hills were still high mountains they would shut the Arctic cold away from the lower central valley in winter and keep the summer far north.

An island. around by the is everywh alike in its cl plants, people the work the But a contin bordered by and cold waters. Ιt takes days for one storm to blow over it, and the storm is changed by the kinds of land it travels over. The continent has room for a great variety of coasts,

mountains.

valleys, riv-

America

Symbolic Group by Daniel C. French at the New York Customs House.

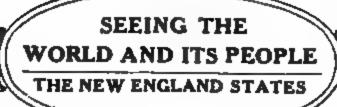
ers, plants, animals, people and climate; many kinds of soil, forests, mines and other things for people to work with. When America Was a New World

We haven't told you anything about the people of America or the work they do. We wanted you to see our continent as it was when Columbus came. Beautiful, wild and lonely, it was stored with a wealth of useful things that had never been used. Then the white people came here to make their homes. Most of them were poor,

but they had their strength and and their habits

urned the virup to the sun d the seeds of plants. Thev lown the forests, laid out roads, and bridged streams, built towns and mills, ships and railroads and schools, and opened the mines. They conquered every difficulty, won their freedom from the old world, raised up governments, pushed west-

ward across three thousand miles of mountains, waterways and plains, and traded with all the peoples of the earth.



# Land of the Pilgrim's Pride

## Plymouth Rock, the First Pilgrim

This is a glacial boulder, or erratic, brought by the continental ice sheet. The name erratic, meaning "wanderer," indicates that Plymouth Rock has been transported from some other place. Erratics are usually of a different kind of rock from the ledges in the region where they now rest. It seems appropriate that this "earlier pilgrim" should have been here to welcome the Pilgrim Pathers in 1620.

THIS is the story of a country that was born poor and became rich and famo Countries

boys. Those

livings can be made too easily, are apt. to amount to little. Their Hard Work people become lazy. Good for Boy But where the weathand Countrie er is cold and the soil sterile, people must work hard to live in comfort. And just being obliged to use their hands, minds

and courage
makes people
wonderfully
brave, industrious, ambitious and
nere are sevntries in the
called "Brave

### The Settlement of New England

New England is the poor boy section of the United States. The Puritans settled these five small states that lie away up in the bleak northeastern corner of the country. You know what determined,

### PICTURED KNOWLEDGE

hey were. Had is mountainous. would have beand gone back of the land wes

tains and Berk River. The \ knot of snow-c

ı a small, comgether with the Hampshire, trai

The New England Coast After a Storn

sullen htts. S lso wer ie and d along a along surface ints. ' that in seless such a

th an untry ges Con atu ange their ablel s, an end of M es a ınd is

thing happened, thousands of years ago, to rob New England of a good top coat, if it had one, and give her a poor one.

covering much of the northern world, in Europe, Asia and America. It covered Canada and came far down into the United States.

### The Glacier of the Lakes

#### Down to Bed Rock

Men who know a great deal about Geography can tell exactly what

In the glacial age the ice was so thick that the land was buried to the

tops of the

rocks. The bottom of the gla-

New

Ice.

happened by looking at the map of New England. The first thing they notice is the many lakes scattered all over the northern and westparts. ern There are sheets of water. from tiny ponds to big Lake Champlain. Maine alone has nearly two thousand big

and little lakes.

How the Glacier Writes Its "Calling Cards" highest mountains of England. like water and snow, spreads and becomes level on top. This vast ice sheet filled all the valleys. As it moved slowly southward it scraped the bed beneath it, and the mountain slopes, bare of soil, down to bed rock. Then

it broke off

cier was filled with stones. The loose

ones were ground to sand and gravel.

Those that were held fast had their

faces scratched and flattened and

This is a crevesse in a glacier, formed by the splitting of the top layers of ice. The crunching and grinding of the ice at these crevesses, with the help of the rocky waste being carried along, carves and scratches the rocks in the path of the glacier.

They are strung along a network of aimless streams that wander over marshes, in the hollows of hills, before Secret they decide to flow away The Lakes Tell into proper rivers. Those waters were left in rock basins, or in old river valleys that had dams built across them by a glacier.

smoothed into pebbles and boulders.

## The Creeping Field of Ice

In New England the glacier extended to the sea shore. Just such icebergs as come down into the North Atlantic from Greenland today, broke from the cliff-like front of this old glacier, float-How the Glaed out into the ocean oier Dropped Cape Cod and melted. The soil and stones it had brought down were dropped into the sea. So much material was carried out that sandy, rock-strewn islands were built up. Even Long Island and the hook-like

A glacier is a river, or great field of slowly moving ice. Of course you know that there is ice all Big Nightcap around the North Pole. the Earth Once Wore A field of ice that never melts covers most of Greenland. At one time this polar ice cap. was much larger than it is today,

# How New England Soil Was

The mass of rounded pebbles in the bed of this atream will be mad and washed together. The sharp edges of the stones have already bee of New England's stony, barren soil was made in this way.

Granite Eggs with Cracking Shells

Rocks are like hard boiled eggs. They perature changes suddenly, the outer lay interior. This makes it crack, and peel off rocks in the picture are just aplitting off

# Model of Southern New England

E,

# Carving Designs in Marble

#### @ Kopstone View Co.

toward the old world. It is a great advantage for a merchant to have a corner store, with doors on two streets. New England A Corner Store with is a sort of corner store Many Doors which many ships are obliged to pass. And it has many doors, or seaports. Boston, Portland and Providence are wide doors. Many of the largest ocean vessels come into their harbors at a time, to load and unload. And there are countless smaller harbors for fishing boats, coastwise vessels and ship It was plain to those seafaring colonists that New England was a fine country for trading; and that all those water falls should be set to work, making things to sell.

What should they make? "That," as the little boy said, "was the puzzle of it." They had nothing to make things out of besides trees.

So up Fish needed only to be Sprang the smoked and salted. Factories There was no market for their fine building stones, slate and marble, as there is today. They could not grow much wheat. They

had no sheep. The trading vessels brought cotton from the southern colonies, wool from England and Spain, hemp from countries on the Baltic Sea for rope making. Every town had its tannery for turning hides into leather. When iron was found in the bogs it was smelted in charcoal furnaces. New England was one of the first countries in the world to make cloth, shoes, iron, rope and other things on machines run by water power.

The people were in training for running factories for a century or They had done everything more. they could for themselves. man had a workshop on his farm and did his own "tinkering." mended his tools, his A Country his boats Full of plows, Tinhers nets: shod his horses: cobbled his shoes. When iron was first made, all the nails were hammered out in small forges, by men and boys, on the farms. Salt was e-vap-or-ated from sea water; hats were felted of beaver fur; tar and turpentine were made in every lum-

#### PICTURED KNOWLEDGE

were just as clever as the men. A spinid loom were in thing from a c has to be brown vania to make water power fo mills. But a g

**Drying Gloucester Codfish** 

husetts, is a good barbor and a fishing port. Her

'lax was grown, and in the stony fields. y wove cloth for shold use, cloth to nd sail-cloth for the d looms.

that the "Yankees" became the cleverd shrewdest traders
It is said still that
Rhode Island and
the patent office in
y.

### Make Everything

tions of the United manufacturing than England does, but is because they are er and have raw

materials of their own to work up. New England has to bring everythe people wor than in any oth try, and a great are made.

Cotton is brouern states; wool from Australia hides from the cities and Sout

gold and silver from far-away mines, to keep the countless factories busy. Below the mountains the country hums with mills. People set their clocks by the noon whistles. The land is netted with railroads. The harbors swarm with shipping. Boston is the dis-trib'-ut-ing center. Railroads run out from this big seaport like spokes from three-quarters of a wheel. A short haul takes materials and fetches finished goods

## D KNOWLEDGE

10 Lumber Camp

River

ga are mill, ch they etimes danger n them. the peaks of the White Mountains, and carved the descents for the cascades.

Tourists love to sail along the rock-fringed coast of Maine, linger on the cliffs of Mount Desert Island, or camp and fish in the lake-dotted pine woods. By cog-wheel railway they go up to the resort hotels on Mount Washington, the highest peak of the long Appalachian Highlands. Down the terraced valley of the Connecticut is four hundred miles of beauty, of wooded slopes and dropping falls. Thousands of city dwellers have summer palaces on the cliffs above the sea at Newport, cottages on the islands and beaches, or country homes in the lovely Berkshire Hills.

If you should ever go to New England you would not know what to see first—Bunker Hill monument in Boston, or the new public library Things of with its wonderful Interest mural, or wall paint-leverywhere ings; the near-by homes of our dear poets; or the biggest cotton mills in the world. Most people

cross Massachusetts Bay to see quaint, sleepy old Provincetown, just inside the sandy hook of Cape Cod, where the Pilgrims first dropped the anchor of the Mayflower. There they find the "old salts" of Yankee sailor and fishermen, who speak of New England as "down east." They go up to Salem to see the custom house of East India days, and the old whaling ports of Marblehead and Gloucester. Then down to Plymouth, an hour south of Boston, to see the famous Rock, under its marble canopy, the colonial museum, and mossy gravestones of the brave company that died in the bleak winters of three hundred years ago.

Still woods and busy mills, lakes and mountains and rocks, incoming and outgoing trains and ships, fair weather and foul, monuments, Sabbath bells, books, brave deeds of free men, and memories—all New England is the

"Land where our fathers died, Land of the Pilgrims' pride."

New England Stories in Other Books.—Whittier's "Snow Bound" describes a New England winter. Hawthorne's "House of Seven Gables" is a story of Old Salem. Joseph C. Lincoln tells of "Cape Cod Folks" and Sarah Orne Jewett of "The Country of the Pointed Firs."

#### The Pilgrim Fathers

The breaking waves dash'd high
On a stern and rock bound coast;
And the woods, against a stormy sky,
Their giant branches toss'd.

And the heavy night hung dark,
The hills and waters o'er,
When a band of exiles moored their bark
On the wild New England shore.

Not as the conqueror comes,

They, the true-hearted, came;—

Not with the roll of the stirring drums,

And the trumpet that sings of fame;—

Not as the flying come, In silence, and in fear;— They shook the depths of the desert's gloom With their hymns of lofty cheer.

Amidst the storm they sang;
Till the stars heard, and the sea;
And the sounding aisles of the dim woods rang
To the anthem of the free.

The ocean-eagle soared
From his nest, by the white wave's foam,
And the rocking pines of the forest roar'd;
Such was their welcome home.

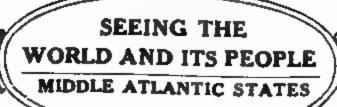
There were men with hoary hair
Amidst that pilgrim band;
Why had they come to wither there,
Away from their childhood's land?

There was a woman's fearless eye,
Lit by her deep love's truth;
There was manhood's brow serenely high,
And the fiery heart of youth.

What sought they thus afar!
Bright jewels of the mine?
The wealth of seas? the spoils of war?
No—'twas a faith's pure shrine.

Yes, call that holy ground,—
Which first their brave feet trod!
They have left unstain'd what there they found—
Freedom to worship God!

-FELICIA HEMANS



# The Keystone Group



H. E Turnet

#### The Uses of Wealth

This picture by the American artist, E. H. Blashfield, is part of the Citizens' Bank Building in Cleveland. It symbolizes the uses of with upon labor for the development of the resources, not only of the Mildroup, but the resources of this whole great, rich land of ours. Here is Wealth seated upon a throne with her golden key in her his the sturdy workman whose efforts have created her and her power. a half-finished sky-

a half-limined say-scraper, in the background, is a group of claim-a at a, presenting their pleas before the throne of We aith. They are introduced by Civilization, a winged, half-grown child. The

NHE next a door s topped opening

dle stone of the arch. The "key" stone that locks the arch is so shaped and placed as to give The Keyetone strength. Should it of the State Group drop out, the wall above would be very apt to tumble like Humpty

Pennsylvania, a big, solid oblong, is nicknamed the Keystone State. It deserves this honor, for

manufacturin United States can think out tl being so impor

#### On the Grea

When a mer he looks first f He wants a co on a main bus many people a

### PICTURED KNOWLEDGE

In the Slums

to win a race. It doesn't do for boys and countries to have things come too easily. There should be some things to overcome. The difficulty in these states is a low, but wide mountain wall between their east and west water fronts.

The widest part of the Appalachian Highlands lies diagonally across them from northeast to southwest. They begin east of the Hudson River in hilly ridges that run into the Green Mountains of New England. West of the Hudson they begin in the craggy knot of the Catskills. Adirondacks of Northern New York form a separate mountain mass a bovethe wide valley of the Mohawk River. South of New York State the highlands widen, until they cover most of Pennsylvania.

Everywhere, as you can see, mountains lie between the ocean In the alums of great cities the children do not get enough fresh air, sunshine and play to make them well and strong.

"The Walderf"

ports and the inland waterways. To cross those states is like going in at a front door, climbing the narrow, winding stairsofsome river valley, scrambling over a ridgy roof and tumbling down a summer kitchen shed to the back door. It is really easier to go around the block.

#### Turning the Mountain Wall

By going up the Hudson River to the Mohawk, trains and ships can turn the north end of the mountain The Water Gap and the Front Door wall. Here is the only low water gap in the long Appalachian Highlands. Don't forget that. was this that made New York City, instead of Boston or Philadelphia, "the front door to America "

Partial water gaps are made by other rivers. The valley of the Delaware is beautiful, but ships cannot steam up that river as far as they

The stories of New York that deal with the life of the rich—with "Society"—almost never fail to mention the Waldorf Astoria, one of New York's most fashionable hotels.

#### PICTURED KNOWLEDGE

### At the Sign of the Fish

Here's a Russian Jew's stand in the Jewish quarter of New York's East Side. The scales for weighing the wares are fastened to one side of the beam, and on the other is strung up a fish in the place of the brilliant electric sign that more prosperous merchants use to advertise their wares.

#### The Story of the Shoe String Man

It's a queer thing about big businesses. You would naturally suppose they started in a hig way, wouldn't you? But they don't. Trace any big business back far enough and you will find that it began in some small way, like that of the little fish dealer with his crude fish sign just above us here. Take, for instance, the story of the shoe string man. He came to New York City a poor immigrant without much education and practically no money. You can judge how little money he had from the fact that he began by selling shoe strings on the streets. Then, when he got a little money ahead, he added shoe blacking. When he got a little more ahead he opened a small store in which he carried not only aboe strings and shoe blacking, but other things. All the time he was studying his business as if it was the biggest business in the world. He found out what blacking was made of and so increased his profits by making his own blacking. Then from being a retail dealer he began to sell his blacking at wholesale and employed first one salesman and afterwards a good many. One of the customers he had was a boot and shoe dealer in Colorado. The dealer failed and among the few things left for his creditors was some stock in a gold mine. The shoe string man—following his habit of looking into things— It's a queer thing about big businesses.

went out to Colorado, investigated the mine, came to the conclusion that it only needed proper equipment to be made profitable, made it profitable, and so got into the gold mining business. Before long he owned not only one gold mine, but several, and following the same principle of cutting out other people's profits and increasing lime own that he had done in making his own blacking, he, with his brother partners, built his own smelter for refining the gold from his mines.

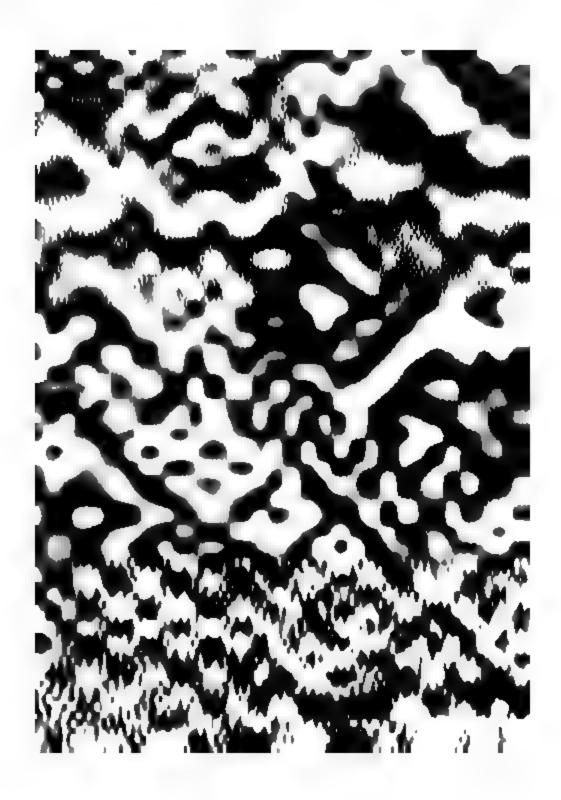
From here on the story is dull, because he just kept on getting more gold mines and more gold mines and richer and richer. The most interesting part of the story and the most important part is how he began and how all big businesses begin, just like a big oak tree and everything with that grows begins—with a little tap root; and each successive development of the business; just as the branches grow from the trunk of a tree, the limbs from the branches, the twigs from the limbs.

What another very rich man, who also began

from the limbs.

What another very rich man, who also began very poor, as most very rich men do, said about his business—"this is a good business"—is true of all businesses. Study your business—and stick to it. The commercial life of New York and

other cities is built on this principle.



The first land that is sighted by vessels entering New York Bay is Sandy Hook, New Jersey. A light-house stands there and pilot boats lie near to guide the steamers through "The Narrows" into the harbor. Sandy Hook is a sample of what you

would see all along the shores of these middle But the sand is states. not filled Here the Glacier Spared with bouithe New Land ders as in Eastern Canada and New England. The glacier reached the sea only around New York Bay. The good soil was not scraped from the broad mountain valleys and the coastal plain.

### Fertile Lands for Farming

The white settlers of

these states found fertile lands for farming all along the coast. In the northern and western parts wheat, potatoes, apples, hay and hops grewwell. Grapes, peaches, melons, and the most delicate vegetables could be Farming grown in Colonial Days around Delaware Bay. In Virginia, Washington and other states, planters grew great crops of tobacco for the London market. A wharf ran out from every big estate or plan-

tation, for ocean vessels could sail up every tidal river for a distance of about eighty miles from the sea. In the south, this coastal plain was called the "Tidewater of Virginia." Along the w sandy plain, the to a rocky shel all the rivers f falls that were wheels of saw at the falls, a belt

The Flat Iron

This triangular building, called the "Flat Iron" building from its shape, fills the angle where Fifth Avenue and Broadway, New York's two greatest thoroughfares, come together. It is one of the best examples of the akyscraper, the most modern form of architecture. Massive, yet graceful, it towers upward, typical of America's business enterprise and ambition. Read about the akyscraper in the story of architecture.

tended for fifty miles westward. It stretched along the eastern base of the mountains, from New Jersey to Alabama.

Find Trenton, New Jersey, on

### MIDDLE ATLANTIC STATES

# Brooklyn and the Famous Bridge

## How New York Solved Her Transportation Problem

This is a cross-section of the McAdoo Tunnel. Moving her millions of people to and from work or play, night and morning, was New York's big engineering problem. Now you can ride underneath both the Hudson and the East Rivers, under miles of tall buildings, from one side of the great city to the other, in the subway.

your map. Draw a line from there to Philadelphia, Baltimore, Washington, Richmond and Petersburg.

Through these cities, and "Fall Line" on southward and around the southern end of the reduntains, runs the famous Fall Line. This Fall Line is so important that we spell its name with capital letters. Along it, rushing waters turn the wheels of factory cities. Washington is so busy governing our country that it does no manufacturing, but it gets its water supply from above the falls of the Potomac,

The fifty-mile wide strip of higher land, between the falls and the first range of mountains, is called the Piedmont Belt. You might forget that odd name if you did not know that it is Latin for Foot-of-themountain Belt. We spell its name
with capital letters, too. Together
with the coastal plain, it feeds the

About the hungry cities at the falls
and the seaports. Although this belt lies
high, it was once covered with forests
and it has the fine, lowland soils of a
mountain valley. The air is pure,
cool and moist.

The northern end of this Piedmont Belt is covered with small, rich truck gardens and fruit farms. In Virginia, it grows the tobacco crop. Much of the coastal plain, or Tidewater of Virginia, is now used to grow something you like—peanuts. Peanuts love to push their pretty shell toes into the soft warm sand,

4-1-Auto-1-4-4-4-4-4-4-4-4-4-4-4-4-4-4-4-4-4-4-	TELEGRAPH TO A CO.
PICTURED	KNOWLEDGE

The Grand Central Station in New York

The picture shows a cross-section of the Grand Central Station of New York City, which is the terminal for all roads running into it. Notice that there are "Ramps," that is, inclined passage-ways, instead of stairs and elevators. Counting the viaduct across the street at the right there are six levels of traffic here. Can you find them all?

The Tangle of Traffic Underground

# New York

# PICTURED KNOWLEDGE Pittsburgh and the Rivers that.

into the great Pittsburgh of today. Do you know the names of these Pittsburgh Stoel Works at Night

© Fonder Wyde
Pittsburgh is sometimes called "The Steel City" from its leading
one of the great steel works at night.

### untains

### Marcy

the heart of this what they are? timber line. The rise here.

eft beof the bank. a long ι their Storm erberg ntain). 1 these is they 1 Ger-Jey is peaks where y crew Hudd with some name,

river ls and

## and How They Were Made

Colden Avalanche I Mt. Jo

mountain mass. The summits rear themselves high It means either youth or resistant rocks. In this ca soil is poor and the slopes too steep for agricultur

> foams down a rocky bed tha Wild ducks comes steeper. geese are often seen, for the this beautiful route for their s and fall travels, north and s When the ice breaks up in the s eagles and crows wheel out of f crowned heights to Up Where fish. Then the the Eagles Wheel river, no more th mountain brook, leaps down the Adirondacks. This rugged of very old mountains is ar spoiled wilderness, the paradi summer campers. It is now a reserve and state park of more two million acres. High up i wooded peaks the mighty Hi has its beginning in a wee, b drop of a glacial lake that is a "The Tear of the Clouds."

The Hudson River is one o

### ■ PICTURED KNOWLEDGE

Pleasant Valley in the Catakili Mountains

the Catskills are too steep and have too poor soil for agriculture, so re used for farms. These particular valleys are for more valuable for and you would never guess what it is—they supply distant cities with hich you see in this picture, has been dammed a little farther down ith forty miles of shore line has been produced by the dam and the water ork City, ninety-two miles away. The sites of seven villages were covhis. In this way the rainfall of the Catskills is used and the water objectause there are no settlements on the mountains to empty their sewage

The Beautiful Valley of the Hudson

even crestline that is typical of old, worn ranges like those of the Apparolling valley of the Hudson, with rows of trees marking it into grain the Hudson is so varied and beautiful that the river has been called "the reason for this is that the Hudson, instead of flowing along a lengthwise a ranges, cuts across the highland, making palisades and cliffs, forming and sometimes wide flood plains over which the waters of the river

# "The Rock of Ages" Below the American Falls

Those great blocks of stone have tumbled from the crest of the fall; they were sapped away by the removal of the weak shale rock underneath. The river here is unable to carry off these rocks, as the water at the Canadian side of the Falls does. Here they lie, telling their story of the lessening force of the water on the American side of the Falls. The American Fall is daily being robbed of its water by the Canadian Fall. Some day it will disappear entirely.

In a little while, a thousand years or so, a thousand years are as but a moment to the professor of geology—a tourist visiting Niagara will see above this rocky rampart no falls at all; only a bare cliff. The Canadian Falls will have eaten its way around into the water supply of the American Fall and carried it all away. The Canadian "horse shoe" is cutting back at the rate of five feet a year, while the American Fall is wearing back at the rate of only three inches per year. The Canadian Falls, pouring over a much larger volume of water, can churn about the blocks that tumble from its limestone capping, and this great churn drill constantly deepens the horseshoe in the middle of the channel and so cuts into the American side of the Falls.

And what do you suppose gave the Canadian Falls this advantage? Goat Island! The island divides the waters of the river and leaves the larger proportion to the Canadian side.

to the state tags and a constraint of the

### PICTURED KNOWLEDGE

Model of Niagara Falls and Gorge

the story of "The Land of Cotton." There is the cotton plant itself, ready for picking, with one boll just beginning to break open; two scenes of the cotton pickers at work; the latest and best type of cotton bale, and various things made of cotton, including a doll's hammock and a doll's apron made by the little weavers and seamstresses themselves.

TO other part of the big United States has had so many loving songs written about beautiful sunn The gay wo "Dixie Land"

make you think of bright skies,

even in December; of wet green rice fields; of sugar cane, and corn, 1, and orange f cosy cabins 1 plantation e you think of

this land of plenty, where every- i tinkling banjos and dancing feet, one gets "fat or fatter." They and of mocking birds singing in moonlit cypress groves.

### za Floor

n States, with the adjoining , of the great and beautiful ilands, the lagoons of quiet

n the midst of the land and the Greater and the Lesser Rico and Venezuela, true I Jamaica. Santo Domingo there to the Bronson Deep, I 37,666 feet, which is higher

Jost of its surface is ed by blue seas. So orget that bold mounthe broad south end \_\_\_\_\_\_

### PICTURED KNOWLEDGE .

New York to Texas. he canal was finished famous Dismal Cod peninsula from twenty feet abo ; to Buzzard's Bay, a six-mile lake le to go from Boston. canal was cut from spreads and n re Bay into Albemarle pools. Cypress all shipping would not ets up to their go around stormy Cape still, dark wate

canal from Che The soil is blac

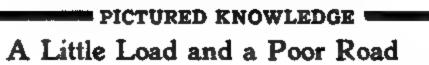
How Rivers Get to Wandering

## SOUTHERN STATES

gth of them, tives in writing est. Strips of tween the "Ke by arches of is Florida Strangenough to ocean river ca

• Land of the Sky"

t seem possible, does it, to ride through an ocean storm on a railroad train? Yet that is exactly over the mainland of Florida to Key West, a distance of 130 miles, bridges long attractes of open rms. Next to the building of the Panama Canal, the building of this road was one of the greatest ap lake, was discovered full of peat. It took two huge dredges fifteen months to dig out this peat because to deal with them as it is to git in one of those beautiful passenger cars and look at the atorm or wrecked one of the house-boats in which there were a number of workmen and many of them this great water railroad is that, like the Panama Canal, it was built entirely on total abstinence



# ■ SOUTHERN STATES ■ Home of the White Heron

the white heron in Florida. The white heron is another beautiful sd until the laws were passed protecting birds. Herons are found the coldest regions. South America has the greatest number of ry beautiful. These birds stand perfectly motionless in the water ich they spear with their long bills. They also eat snakes.

The Blue Heron at Home

are three hing. one foot night, the umes that or Heron.

## SOUTHERN STATES

The Home of the Pelican

# . Florida C



In no other northern country in the world, as in ours, is there such a variety of fruits in the market in the winter. The window of a fruit store or fancy the Harmest grocery in the smallest the est village is a riot of Grocers color—of red, yellow, russet and purple, and inside it is as "perfumy" as a florist's. Nearly everything, except apples, is grown in far away states and

other lands. Don't you often wonder where they all come from!

#### The Citrus Fruits

The citrus fruits—that is, oranges, lemons, limes and grape fruits—are grown in great quantities in Florida and Southern California, but some of them come from the West Indies, Italy and Spain. These fruits ripen on

#### ■ WHERE OUR WINTER FRUITS COME FROM ■

### sat We Find in Shells

on bushels a year, to satmerican appetite. Very d abroad. Pecans come and the southwest. Engs are grown in orchards ia and in countries of Europe. Chestnuts, as is cultivated in Turkey, India. Native hickory walnuts, butternuts, sma and hazel nuts are ust winter markets. Anoth which we have grown olive. There are great oli of twisty, gray-green treern California and quarto us from Italy and Spa

A Hawaiian Pineapple Field

## How Great Cities Got Their Names

HE name of the world's largest city—London—is very ancient. It is thought to be Celtic-"Lyn," lake, and "dun," fort. The Thames was once a wide, shallow lake with marshy shores. Dublin is "Away Back" "the black pool" or lake. Edinburgh is old Saxon in London for "Edwin's fort." Paris was named by the Romans for a tribe of Gauls called the Parisii, who lived in a mud village on an island in the Seine. Rome was named for its mythical founder, Romulus. The legend is that twin boys-Romulus and Remus-were set adrift on the Tiber, and being cast ashore, were suckled by a she wolf. In "Berlin" we find the Celtic "lyn" or lake again. But some students of old names think the name is the German "bruehl" from "buerhl," a marshy place, with the ancient ending "in." Vienna, nearly two thousand years ago, was a Celtic settlement called "Vindomona," but Berlin's Name in old German myths it is called "Wien," the W Related to London's being sounded like V.

The little river that flows through the city is still called "Wien." Con-

stantinople is the City of Constantine, named for the Roman Emperor,

who conquered it in the Fourth Cen-

have some simple meaning. Peking

Far Eastern cities nearly all

is "the northern capital," Tokyo, Japan, is "the Eastern capital."

#### City Names in Uncle Sam's Country

When white people began to colonize this country they adopted some of the pretty Indian names, but they often called their new homes after the old ones, or named them for kings and nobles. New York was named for the Duke of York, afterwards King James II. Charleston for King Charles I, and Baltimore for Lord Baltimore, who had a large grant of land in Mary-Boston was named for Boston, or St. Botolph's town, a seaport When Boston in England. New Or-Was Botolph's leans was named by the French for the Duke of Orleans, and St. Louis for the sainted King Louis XI. Philadelphia was the Greek name of an ancient city in the Holy Lands, known as the "city of waters." Wherever "apolis" or "opolis" is added to a name it means city. Doesn't it seem odd to find this Greek word tacked onto "Indian" and "Minne"!

Chicago is the name of an Indian chief. San Francisco was named by Spanish missionaries for St. Francis Xavier. Of our neighbors "Mexico" is the name of an Aztec war god. Montreal is Mount Royal. It was named by the French.

and bore deep into the warm waters of the Gulf of Mexico, the bent trunk rises with-A "Tree" out branches for some 4 Thousand Miles Long distance into the land. Then it flings out huge, twisted limbs, east and west, to where the sun rises and sets above the mountains that wall its wide valley. And hundreds of miles to the north, bright little lakes cling to the topmost water twigs like tough leaves that the icy gales could not loosen.

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#### The Grandest of Earth's Rivers

No other river in the world is built on such a grand and beautiful plan. The northern Indians called it Meche Sebe, "father of running waters." It is not only the longest river, measuring over When the Sea four thousand miles Ran Through up to the sources of the Valley the Missouri, among the snowy peaks of the Rocky Mountains, but it has the largest

of North America, that extends from the Gulf of Mexico to the Arctic Ocean. Long after the mountains were raised this valley was still below the sea. The Gulf flowed through as an ocean strait that was narrowest at the northern end. There were two groups of mountainous islands, where the Black Hills of Dakota and the Ozark Highlands of Missouri and Arkansas are today.

This central valley is still very On the water parting west of Lake Superior, where four big river systems rise near together, and flow away in four directions, the land is only six-Let's Wind Our Way teen hundred and to the Gulf eighty feet, or a third of a mile above the level of the distant oceans. The Mississippi descends the gentle southward slope of fifteen hundred miles; but it winds about so much that it travels nearly three thousand miles to reach the Gulf. Don't

CENTRAL STATES

Work of the Waves in Apostle Islands, Lake Superior

work has been easy beside the question of what to do about floods.

Two hundred years ago the French settlers of New Orleans were obliged to pile up an artificial bank,

or levee, to keep the town from being washed away high b y water. St. Louis, and other cities, were built mostly on the bluffs. But their warehouses, wholesale business streets and freight yards, had to be

down on the river banks. The richest farming lands for sugar and corn, were in the river bottoms, too

Raning the River flood plain is quite sixty miles wide. So sixteen hundred miles of levees had to be built on top of the banks, clear up to Cairo, Illinois, and up the lower tributaries.

In most years these levees protect the towns and farms behind them. But sometimes the waters rise so When the high that they burst Floods Break dams, run over or break through levees and flood cities even on small northern streams. Then people are drowned, property is destroyed, and thousands of square miles of land are flooded, from St. Louis, Pittsburgh and Kansas City to the Gulf.

#### The Forests and the Floods

We must get at the causes of these floods in order to stop them. They

were not nearly so bad before the forests were cut down. And it is the Ohio River that makes most of the trouble. The Ohio is not as long as the Missouri, but it has many more

The Work of a Flood

"Sometimes the waters rise so high that they burst dams, run over or break through lavees, and flood cities even on small northern streams. Then people are drowned, property is destroyed, and thousands of square miles of land are flooded." You can see some of the wreckage caused by the flood at the edge of the water.

branches. You see, the eastern part of the valley gets more rain from the Gulf and the Great Lakes, than the western When the snow goes off, and again during spring rains, all those big and little feeders of the Ohio

are bank full at once. Then floods of water pour down to the already swollen Mississippi.

#### To Control the Floods

To control the floods it is proposed to reforest the head waters of the streams, make reservoir dams among the hills; build the levees higher and water-tight; and cut across big bends to shorten and straighten the river and Why the Ohio Makes give it a swifter flow. Trouble Dredging would clear the channel, and miles of the softest banks would have to be jettied like That would take hard the Passes. work, years of time, and it would cost mints of money. But it would keep flood waters within the banks and make two hundred and fifty streams, or sixteen thousand miles of waterways, deep enough to float large steamers. Every part of this big valley would be connected by water with New Orleans and the

### 🕶 Central States 🛚

# At the Stock Yards Cl

Here are several thousand cattle from all over the great Miss regions of the West and Southwest, herded together at the Stor Lundred in the pen in the foreground.

Putting Up Boof in Bales

# ■ CENTRAL STATES = K's the Products c

fumber, on the



and copt tracks of corn and cattle, and as distributing centers for goods that farmers need. Do you find some! The Ohio River needs a few big cities. The Falls of St. Anthony on the upper Mississippi, are in the middle of the wheat district. So that is where A Good you might expect to find Game to Play a flour milling city and Grand Rapids, on shipping port. the edge of the Michigan lumber country, makes furniture. Columbus, Ohio, and Indianapolis, Indiana, have grown to be large manufacturing cities because it was easier for many railroads to go through than around them, and they are near coal and natural gas fields. cities on the Great Lakes are where they can stop boat and train loads of wheat, cattle, lumber and copper and iron ore. So they turn these into flour, meat, steel, pianos, automobiles, electrical supplies and countless other things.

Chicago is the largest city of the valley and the second largest in the country because it stands at the head of Lake Michigan. Here, in the very richest part of the valley, water and land travel begins and ends. It's "change cars"—or boats—for people and goods, at Chicago, no matter in which direction they are bound.

#### The Treasures Hid in the Ground

It isn't so easy to place the minerals as the cities. You think of minerals as being found in mountains. So it is not surprising that The Hunt gold and silver are in the Black Hills, and lead Minerals and zinc in the Ozarks. A glance at the map will show you that the coal, oil and gas fields of Ohio are really in the foothills of the Allegheny Mountains of Pennsylvania. But it puzzles a good

many grown people to find copper and iron on the shores of Lake Superior, in upper Michigan and Minnesota; coal in the low river valleys of Indiana and Illinois, and salt beds and petroleum in Kansas, Oklahoma, Louisiana and Texas. We will have to try to account for these.

Do you remember that there was iron and copper in Canada, north of Lake Superior! The Great Lakes lie in a long, wide valley of those old Laurentian Highlands. Their basins were filled with water by the glacier. Ridges of these oldest mountains of the continent appear south of Lake Superior. They make the cliff-like shores of the "Pictured Rocks." They have been worn down to their roots, so that some of the iron-ore beds lie on the surface, and are worked like stone quarries. The copper is still buried deep, but it is very pure and in great quantities. The mines furnish copper wire for the electric lighting, telegraph, telephone and trolley lines that cover these northern states.

Salt beds are supposed to mark the places of dried up dead seas; and coal, petroleum and gas, the fuel minerals, were made on swamps that bordered the sea. Trace a line with me, and we'll find an old seashore far up in this valley. There is coal on the entire western slope of the Appalachian Highlands. Coal, oil and gas are in Pennsylvania, Ohio and Indiana; coal in Illinois, Iowa and Missouri. There is salt in Ohio and Kansas, then oil from Kansas to the Gulf.

That circling line marks the shore

The Ancient of the Gulf of Mexico

Mississippi after the ocean strait

Sea had been closed and filled in northward of the Missouri

River. The warm Gulf Stream swept

### PICTURED KNOWLEDGE

the sky was a burning gold and blue, fleeced with white. The air was so clear, one could pick out the grandour of watch tower and college buildings of a town five buildings of a town five miles away. At four o'clock nearly every afternoon, thunder clouds as black as ink boiled up in the south. After the storm a million golden stars were out in a

in a indig cool | distar It

warm

which it takes so much. The great river system washes enough fine Valley and earth down to the ocean Gulf Work every year to cover two hundred and fifty square miles of land a foot deep. It has filled its flood plain, and pushed its delta of bottomless mud two hundred miles out into the Gulf. Like

of plenty it d its mineruring wealth of the world, nexhaustible he Gulf.

## The Great Lakes

Lorado Taft is the sculptor of this group of five graceful maidens representing the Great Lakes. It stands near the Art Institute of Chicago, on the shore of Lake Michigan. Can you tell which lake each figure stands for? At the top is Lake Superior pouring her store of water into the bowl held by her sister, Huron, below. Another sister, Michigan, is also emptying water into the same basin. Erie is waiting to catch the stream that falls from Huron's tilted bowl, and will, in turn, pass it on to Ontario, who is stretching out her arm toward the sea.

streams running into one main channel that carries all their waters to the ocean. A mountain system is puzzling unless you have a relief map or, what is really better, unless you build it up of modeling clay or wet sand.

How to Study Mountain Systems
As a base for the mountains to
rest upon, you should heap up

up singly, nor from a low plain or valley. All the ranges, peaks and The March domes of a system rise from a table-land Mountains Like columns of soldiers they march in one general direction, although there are always stragglers that fall out of rank, companies on the flanks, flying scouts and sentinel peaks that guard the way.

The Gentle Creature on

Try first modeling our eastern mountains. They are built on a very simple plan. Their base is an elevated belt of land about three hundred miles wide, in its widest parts, that runs from eastern Canada to

Alanorthern bama. From the top of the plateau rise a number of low, parallel ranges, that are much broken by water gaps. Each range has a different name. as has each branch of a rivcr system. Beautiful peaks, domes, knots of mountains and even foot hills have their own names, too. of them, together with the plateau on which they rest, form the mountain system called the Appalachian Highlands. This will help you understand the far greater and more

varied Highlands that fill the western part of North America from

The Alaska to Panama. The
Appalachians plateau base is a mile
and the above sea level, or
higher than all but the
highest peaks of the Appalachians.
In its broadest part, where it is a
thousand miles wide, it fills one-third
of the United States.

Far back from the eastern and western borders of this plateau rise

lofty mountain walls, with snowy crests, towering peaks and the cones of dead volcanoes. These mountain walls are separated by hundreds of miles of semi-desert plateau that is crossed by scattered

Our Right If you had been traveling in Wyoming in an early day—say a few million years ago—one of the interesting animals you might have seen from your car window would have been the gentle creature who is looking at us here. For the diplodocus was gentle—not a beast of prey like its enemy, the flesh-eating dinosaur. Several portions of skeletons of these creatures have been found in Wyoming. They are distant cousins of one of the residents of Florida—the crocodile. The diplodocus is thought to have been the largest of the strange reptile animals of that far off time. The tail is supposed to have been used for two purposes—to switch at its enemies when they became annoying, and also to help it stand upright in the water, where it spent a good deal of its time taking refuge from its enemies, feeding on the little fish and other food floating The formation of the in the water. teeth suggest that they may have been used as a sieve—much as the whale catches food with its "strainer." Its long neck enabled it to keep its head With all four feet above the water. resting on the ground it could put its eyes and nostrils into the air in water five or more fathoms deep. you often noticed a turtle floating about in a little creek or pond with its nostrils just above the water?

ridges of bare rock. Lost and lonely rivers flow at the bottoms of the gorges they have cut across high plains that are parched for lack of water. There is room here for a gray, ash and cinder filled plateau; for a sunken basin dotted with salt lakes and crusted with snowy soda; for seas of purple sage flowers, and sand wastes of thorny cactus. And on the steep slopes and in the broad valleys that front the Pacific Ocean, there is still room for a fairy land of fresh rains, no-

ble forests, foaming cascades, greenery and bloom.

#### The Cordilleran Highlands

Most people speak of this region as the Rocky Mountains; but you can see that the Rockies are only the eastern ranges of the Cordilleran Highlands. The front range of the Rockies springs abruptly from the edge of the mile high grassy cattle plains, in cliffs, with many peaks

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that rise nearly three miles above the level of the sea. In Where the the United States there Giants Spring From the is only one partial break Plains in this lofty wall for That is where hundreds of miles. the North Platte River flows out of a high pass to join the Missouri. There the Union Pacific Railroad finds, at a height of eight thousand feet, the lowest route to Salt Lake City.

This Platte River Pass divides the Rockies of the United States into two watersheds, on which all the rivers of the plateau rise, to flow away east, south and west. One of these lofty knots of mountains is in the neighborhood of Yellowstone Park, Montana. The other is in central Colorado. In both places are tangles of ranges, cross-ridges, spurs, peaks and high-walled valleys called "parks." Northward the mountains bend westward, extend out to the Bitter Root range and begin to crowd to-A Tangle of Ranges, Peaks gether into the tumbling and Spurs sea of forest and glacier draped elevations of the Canadian Rockies. In the middle region the Uinta cross range makes a gigantic bridge to the Wasatch mountains, whose long line looms a mile and a half high above the basin of Great Salt Lake. South of Colorado the Rockies trail away in lower ranges to Mexico, and merge westward into the plateau of the Colorado River.

The Rockies are well named. All of their summits show jagged sky lines of naked rocks, with slopes so steep that soil cannot form upon them, nor trees find standing room. And they lie so far back from the Pacific, behind the Sierra Nevadas and Cascades, that they get little

moisture, and that, in the winter months, comes in the form of snow.

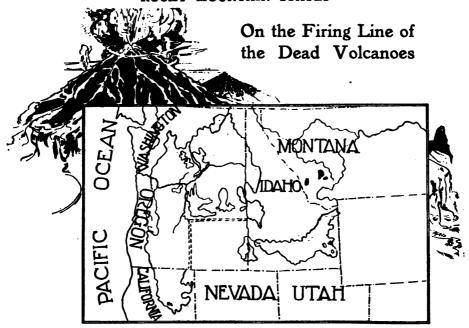
The Wild Sky So the pine and cedar Line of forests of the south are Naked Rockies scanty, the trees small, and cottonwoods are found only along the narrow valleys of streams. In the north, where the ranges are nearer the ocean and there is more snow, many slopes are forested to the crests with the Douglas firs of the Canadian Rockies.

Westward from the Rockies the semi-desert plateau stretches to the Sierra Nevadas and Cascades, from Canada into Mexico. The rivers that cross it gather their waters on the two watersheds of the Rockies and drop in beautiful, foaming tor-The Vast Pla- rents. Flowing across nearly rainless plateaus teau and Its River Gorges they have few tributaries, wear their beds only on the bottoms, and water no broad and pleasant valleys.

#### On the Firing Line of the Dead Volcanoes

In another story we will tell you about the Grand Canon, or gorge, of the Colorado River, one of the natural wonders of the world. In a quite different way the Columbia River is as interesting. Its plateau fills the region between the Bitter Root range of the Rockies and the Cascades, and extends southward into northern California. All the land, even the mountain wall on the west, was lower at one time than it How the is today. The rain had Volcanoes not been shut away, but Shaped the the Cascades were being lifted and folded by earthquake shocks, and built up by flows of melted rock, ashes and cinders from volcano cones.

You can find these old volcanoes on your map-Mount Baker, Rain-



"Imagine this line of volcanoes when they were all spouting dreadful fires. They buried two hundred thousand miles of country under lava, some of it four thousand feet deep." The map shows where these lava beds are. The double dotted line indicates that the boundary of the flow has not been determined.

ier, Hood, Shasta, and smaller ones, in a north and south line along the mountain crest, from Canada to California. Mount Shasta stands ten thousand feet above its plateau base, a beautiful cone shingled and ridged with gray lava rock, and today, mountain climbers go up these peaks and look over ashstrewn ruins into bowl shaped craters that were once bubbling cauldrons. Imagine this line of volcanoes when they were all spouting dreadful fires. They buried two hundred thousand square miles of country under lava, some of it four thousand feet deep.

The Columbia River and its tributaries had to cut new beds across the lava plateau. The Shoshone Falls of the Snake River plunge over a gray lava cliff. The lower parts of many gold bearing streams were filled, leaving fresh water

lakes dammed in mountain valleys. See what a cloud of bright lakes there is on the mountainous boundThe Volaary of Oregon and Calcanose, Rivers ifornia. When the and Lakes Cascades were lifted to their present height, the volcano fires died down, but the lava filled plateau behind them was left almost rainless, because the clouds carried by the winds from the Pacific now drop their rain on the western slopes.

#### The Empty Bowl of the Vanished Lake

The Sierra Nevada Mountains were lifted too, but they had no such volcanic eruptions. Eastward from them to Great Salt Lake and down to the Colorado plateau is a vast depression, or sink, called the Great Basin. Parts of it are below the level of the sea, and so far south that they are sun-parched deserts.

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# PICTURED KNOWLEDGE

Mount Corcoran

@ Hornes K. Turner

These are youthful, lofty mountains. The lake in the foreground glacial deposits, or it may be held in its mountain valley by an avalanch wooded point show that the local climate is not extremely rigorous, for line. The peak rises above the snow line and is clad in ice and snow, its height and general form tell us that it is made of some resistan mountain is being attacked by creeping ice and leaping waters, by weath freezing and cooling, by day time expansion and nightly contraction, a breaking away and sliding down the alopes. The mist around Mt. Corcor laden winds are sweeping over the peaks and passes, having their mevits to fog, cloud, rain or snow in the coolness of the heights. Even the w decay and crumbling of the mountain rocks. After long ages these propeaks and make the mountain lower and lower, until finally it will be redu-

water. Numbers of lakes have lost been killed. A 1 all their water. In their dry beds of borax is take are found thick layers of salt, soda and borax. Much of the surface of the Great Basin is so crusted with the alkalis that all plant life has Humboldt S

every year. Tl Comstock Lode found near Car

Mt. Ranier and the City of Tacoma

PICTURED	KNOWLEDGE	
A "Paul	imade Farm	

# The Sheep Raising Industry

re three thousand sheep grazing on a mountain side.

fly to reach the nat border the rest of the Caslevadas to the ι, Oregon and t of land nearly wide by more long. This is for it is larger st of the great of Europe that fifty million I and vegetable its varieties of is soils, forests, untains, and its opposite Japan a wonderland. ties of the first ion larger than r states of the now that the en, and trade is zific, no future cted for these gerated.

d farther north w England, but o cold. A chill come down the but it is tem1 current that, in the Atlantic,

was born under the equator. The winds are from the west in winter, where Cali- and blow over waters that are warmer than the land. Winter is the rainy and growing season.

In southern California and to the southward, the winds are off shore so there is little rain. But the climate is as warm as Florida, the air dry and pure, and, by irrigation, Los Angeles and other prosperous cities have grown up in the midst of orange groves and vineyards. The people of the Atlantic Seaboard and the Mississippi Valley eat California oranges, lemons, grape fruit, raisins, prunes, grapes, olives, nuts and delicious canned fruits.

## Where the Big Trees Grow

The forests begin in a thin fringe of small trees along the low coast range in the south. From Mount Whitney, in the Sierra Nevadas, whose snows supply the fruit country with water, the forests thicken and widen northward, until they run back to the crest of the Rockies and cover the mountains of British Columbia. In the Yosemite Valley of central California are found groves of the giant sequoias or "big

# ■ ROCKY MOUNTAIN STATES ■ Sixty-Five Acres of Hope

# FOCKY MOUNTAIN STATES

The Fire at Rawhide

The insert shows a fire raging in Rawhide, Nevade. The picture shows the town after the fire. There is practically no town left.

Rawhide Ton Days Later

# ROCKY MOUNTAIN STATES Raising Turkeys and Chickens by th

### ■ PICTURED KNOWLEDGE ■

The Big California Condor

ors have almost disappeared from the rocky le These birds are both homely and diagusting, are bare, and they live on carrion. Settlers i ep, and most of the condors have been killed

Summer Visitors to California

t-billed water birds make the marshes of a Here is a group of them.

## ■ ROCKY MOUNTAIN STATES ■ The Prairie Chicken at Home

#### The Spirit of the Mountains

By John Ruskin

Who has interpreted so wonderfully what we may call the Spirit of the Mountains as Ruskin? Take, for example, the following:

#### CHARACTER IN CLIFFS

The cliff can neither be bowed by the shower, nor withered by the heat; it is always ready for us when we are inclined to labor; will always wait for us when we would rest; and, what is best of all, will always talk to us when we are inclined to converse. With its own patient and victorious presence, cleaving daily through cloud after cloud, and reappearing still through the tempest drift, lofty and serene amidst the passing rents of blue, it seems partly to rebuke, and partly to guard, and partly to calm and chasten, the agitations of the feeble human soul that watches it; and that must be indeed a dark perplexity, or a grievous pain, which will not be in some degree enlightened or relieved by the vision of it, when the evening shadows are blue on its foundation, and the last rays of the sunset resting in the fair height of its golden Fortitude.

#### THE MOUNTAINS AND THE AIR

The second great use of mountains is to maintain a constant change in the currents and nature of the air. Such changes would, of course, have been partly caused by differences in soils and vegetation, even if the earth had been level; but to a far less extent than it is now by the chains of hills, which, exposing on one side their masses of rock to the full heat of the sun (increased by the angle at which the rays strike on the slope), and on the other, casting a soft shadow for leagues over the plains at their feet, divide the earth not only into districts, but into climates, and cause perpetual currents of air to traverse their passes, and ascend and descend their ravines, altering both the temperature and nature of the air as it passes, in a thousand different ways; moistening it with the spray of their waterfalls, sucking it down and beating it hither and thither in the pools of their torrents, closing it within clefts and caves, where the sunbeams never reach, till it is as cold as November mists, then sending it forth again to breathe softly across the slopes of velvet fields, or to be scorched among sunburnt shales and grassless crags; then drawing it back in moaning swirls through clefts of ice, and up into dewy wreaths above the snowfields; then piercing it with strange electric darts and flashes of mountain fire, and tossing it high in fantastic storm-cloud, as the dried grass is tossed by the mower, only suffering it to depart at last, when chastened and pure, to refresh the faded air of the far-off plains.



# HE HOW AND WHY



### Millions of Dollars for a Glass of Pure Water

One of London's Big Town Pumps

My, what a spout! Forty million gallons of water a day pours through it into the Chingford reservoir, which is one source of London's water supply. The "spout" of course is a big pipe that connects with the pumping engines in the waterworks. The Chingford reservoir has five such pumps.

HERE is one big city of over three hundred thousand people, in our country, that had such a hard task to do, to get enough water, that you would think it would have How Big given up trying to be Cities Get a a city. It is lovely Los Angeles, California, in the dry, warm region where the orange orchards have to be irrigated. The nearest pure water, in large enough quantities to supply the one million people the city expects to

have, to put out fires, water parks and lawns and streets, and to irrigate 75,000 acres of fruit lands just outside, was in the Sierra Nevada mountains, two hundred and forty miles distant and several thousand feet toward the clouds. To get that water \$25,-000,000 would have \$25,000,000 for Good Water to be spent. Just to begin to get it one hundred and twenty miles of railway had to be built across mounand semi-desert country,

#### ■ PICTURED KNOWLEDGE ■

New York's Water Supply

holds the water in a reservoir in the hills hig am and is part of the system of reservoirs th

The Wilmington Filter

Wilmington, North Carolina, was formerly a very unhealthy city. Among other things, its water supply was poor. In the course of a general cleaning up of the city's health department, the water supply came under the control of the municipal government, and this filtration plant was put in. Now, few cities have as pure water as Wilmington. Most cities have only settling reservoirs, where only a portion of the impurities settle to the bottom.

"Think of the volcanic peak that once rose here. . . . Scientists have projected the slopes and proved that this cone was as high and much the same shape as Mt. Shasta. The Cruter Lake Club have named this vanished peak Mt. Mazuma."

TE told you, when we started on this journey around and across America, to keep your eyes open, for by and by we'd come to the place where Mr. Thompson-Seton, the writer of wild animal stories, met Johnny Bear and his Mama. He took the cunningest pictures of them with a kodak, from A Visit the balcony of a hotel Bear's Hotel in Yellowstone National Park. This is a big beauty spot which the United States government has set aside as a pleasure ground for people and a safe home for our native wild animals. As no one is allowed to hunt or molest them, the bears there have become so tame that they come out of the woods every evening

of the summer tourist season to get their suppers at the hotel garbage piles.

### In the Cloudland of the Giant's Bowl

On any map Yellowstone Park appears as a tiny square in the northwestern corner of Wyoming. But it really measures sixty by seventy-five miles, and covers the whole northern watershed of the Rockies, from which three mighty rivers flow east, west and south. The center of this big, beautiful, wonderland among the clouds is a giant's bowl of a plateau, lifted a mile and a half up in the air and rimmed with still loftier peaks and ranges. It catches most of the rain and snow of the region to feed the streams which

## Cooking in the Hot Springs



Isn't this a novel way of cooking eggs and boiling coffee? Campers in the region of the hot springs in the days of pioneer travel to the Far West, sometimes cooked their meals this way instead of troubling to build a fire.

in the air. The top breaks and topples in fountain sprays and vapory clouds, that sparkle and shine with set Your rainbow colors in the Watch by Old sun. In five minutes the Faithful show is over, and the water sinks into the earth to be reheated.

Because of the heat and the minerals which crust the surface, nothing green grows in the geyser valleys. But there is plenty of brilliant color. The built-up basins of the vents are colored with various minerals as bright as flower-borders, and some are filled with pools of melted clay that looks like paint. When old geysers have ceased to flow, their black, coral, brick-red, purple or ocher-yellow bowls are filled with ice-cold water, as green as emerald or as blue as sapphire.

Jupiter Cascade is a terraced stair of painted ledges down which hot water flows in thin, vapory veils. And the walls of the How the Paint Grand Canvon of the Pote Got Their Name Yellowstone River have been tinted by boiling springs with all the glowing colors of sunset. Twenty miles long, and from one thousand to fifteen hundred feet deep, this mighty gorge is Nature's greatest picture gallery of sculptured and painted stone.

It takes a week, traveling by stage-coach over the fine roads laid out by the government, to see all the beauties and wonders of this wild park. If you should ever visit this or any of the other national parks, be sure to take your camera and snap-shot the wild animals, the marvels of nature and the beautiful

views of mot streams.

#### The Hot

The Yellow
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tional parks, I
not, as many
think, the old
was set aside i
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Springs dis
Arkansas
served nearly
years before.

This smal of less than . sand acres, lie rising prairie the Mississipp freaky eart shock Work of "Early push Earthquakes a ST gion of shar row, Z1g-2 ridges. The of them are n than twelve h the level pla higher. So clamber all ov good roads as by the govern the wild and .mountains, w deep ravines, dashing stream

The hot spr much the same the Yellowsto dissolved in th good for trea So this is a h famous one in ernment donat ing of a city;

# NATIONAL PARKS W The House the G

Kepstem Here is illowate

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re colo nd son mint"

### OUR NATIONAL PARKS

A Cirque and Tarn in Glacier National Park

# ■ OUR NATIONAL PARKS ■ The Gateway to the Garden of the Gods

tire season would not exhaust the beauties of the park. Hetch-

At the gateway to the Garden of the Gods in Colorado, one sees grotesque rocks fashioned by the weather. The dark-colored cliffs in the picture are made of red sandstone. Sandstone consists of grains of sand, usually quarts.

In Beautiful Williams Canyon

neighbors, for the most delicate flowers and shrubs bloom at its feet. All the "big trees" Giants Kind are on this western slope to Little Neighbors of the Sierras, a mile or more above the sea. The tracts never were numerous, and many of them were destroyed by lumber companies before the Government became alarmed. Those that remain will now be protected as natural and beautiful wonders, for no trees of such gigantic size or venerable age exist anywhere else in the world.

#### Crater Lake National Park

It is along the crest of the Cascade Mountains, in Oregon and Washington, you remember, that the line of old volcano cones is to be found. One cone in southern Oregon, just north of the Klamath Lakes, lost its head in a Volcano Lost curious way. The vol-Its Crown canic fires melted and poured out so much of the interior of the mountain through craters in its sides, that the center became as full of holes as a sponge. having nothing to support its weight, the top of the mountain fell in, leaving a bowl-shaped pit five miles across and four thousand feet deep. This hole is now half filled with water from melted snow, a sheet of the darkest, clearest blue, that has been named Crater Lake. In the whole world, it is thought, there is no other volcanic peak that has collapsed, as has this one, and then set a crystal mirror in its The Crater and Its Crystal headless top to reflect the sky and its own circling rim of towering cliffs. In beauty, grandeur of scenery and natural wonder it ranks with the geysers of the Yellowstone. So the United States has set aside the whole mountain-top for Crater Lake National Park. Besides the increasing number of tourists who visit it every summer, scientists come from all over the world to study this curious specimen of volcanic geology.

The difficult way to it lies up a steep slope thickly grown with dark fir trees, and strewn with glacial boulders. After the volcanic age the great polar ice-field rolled over and buried these mountains. It may have been that this honey-combed peak was crushed in by the weight of the ice, and the melting glacier formed the lake. In climbing up the slope you come sud-The Blue denly to the dizzy brink Sea in the Big Cup of this pit, and looking down a precipice of solid rock, see a gigantic basin of heavenly blue a sapphire of the skies. No wind can get so far down to ruffle its surface, so like a flawless looking-glass five miles wide, it reflects the sky and its own twenty-mile rim of unbroken cliffs which tower from five hundred to two thousand feet above the water. Those sheer walls drop as far below as they rise above. There is no single bit of sand or pebbled beach, and no outlet to that imprisoned lake that can be seen. In countless places little rills trickle down from the rim. The enormous bowl must have been filled by the melting snow ages ago, but that water escapes through hidden crevices to feed springs which burst out on the mountain side and flow away to the Klamath Lakes.

Think of the volcanic peak that once rose here, shooting flames and melted rock in a towering column in the air.

Scientists have projected the slopes, and proved that this cone was once as high and much the same

he es he ;

to toil on up to Columbia Crest, the summit of this lofty and lonely peak. There, as stand vou on a great dome of snow, over unknown depths οi ancient i ce, vou can look down the upon radiating, glacierfilled gorges, and out over hundreds of miles o f lesser peaks and ranges and billowy waves of

### The National Monuments Nature Made

forest.

Altogether the Unit-

ed States has a scenic empire of over five million acres, only a small part of which is, as yet, open to the traveler. Besides these ten large reserves there are twenty-eight tracts unsuitable for parks that are under government protection as National Monuments. The greatest of these is the Grand Canyon of the Colorado River, which for more than two hundred miles cleaves the high plateau of western Arizona. In its lower course this gorge is a mile

# Looking Into the Grand Canyon

Part of the Grand Canyon of the Colorado reveals a great succession of precipices and slopes. The precipices are on resistant rock like limestone or sandstone, the cliffs on weak rock like shale. Just a glimpse of the Colorado River appears in this picture between the Indian and the tree. Its tributaries, like the stream in the side canyon opposite, have branches, and these have smaller affluents, so that the canyon wall is cut up into innumerable ridges many of which are isolated to form the so-called temples and buttes. It is 5,450 feet, or over a mile, vertically from the river to the level horizon line opposite Pima Point, where this picture was taken. The broad shelf just above the head of the Indian is 3,400 feet below us, and hence shrubs there appear like tiny specks.

deep and fifteen miles wide. Tourists can reach the rim at several points and gaze down into and across the mightiest fissure any river has cut into the earth. John Muir, the poet of the Sierras. called it "The Abyss of God."

The other monuments are
small. Each
consists of
some one
natural
wonder or
beauty, object of historic interest, or prehistoric re-

mains. Among the most interesting are Lassen's Peak in California, our only active volcano; Muir Woods on the coast near San Francisco, the largest and finest of our redwood forests; the Devil's Tower, a thirteen-hundred-foot-high, twenty-acre monolith of rock in Wyoming, and the petrified forest of Arizona. Many canyons, caves, cliff and adobe villages, cinder cones, natural bridges and old Spanish mission churches, scattered over eleven

Moran's painting of the Grand Canyon tells the story of one of the grandest and most aweinspiring of Nature's works. One sees a vast

The Chasm of the Colorado

A Geologist's Interpretation of an Artist's Picture

chasm, falling away so abruptly that the observer involuntarily gasps. Muir called it "The Abyss of God."

The rocks in the foreground are horizontal limestones—horizontal, as the many level lines in the landscape say over and over again—limestone as is shown by the crystalline texture of the rock. The glance of the eye falls over precipices, passes down more deliberately over slopes, but always hurries downward, for the dominant direction at the Grand Canyon is not across or to the right or left; it is down. On the way down, however, the eye is arrested by the different appearance of certain rock ledges. This cliff does not appear to be limestone. It is more crumbly, more sugary-looking. Perhaps it is what the geologists call sandstone. That slope seems to be made of weak rock, else why should there be a gentle declivity rather than a sheer precipice? Perhaps the rock is a shale, or consolidated mud. Some of the ledges are red, some yellow, many are gray. One recalls having heard that minute quantities of iron in a rock will stain it red or yellow when oxidized or rusted in the air. And now the color impresses us as natural and pleasing, for in nature even gaudy pigments blend and harmonize.

In the distance we see the river, a silver thread, winding through the abyss and finally disappearing behind the most remote precipice. We hear, but do not appreciate, that it is five or six thousand feet below us. Some one in our party remarks that the canyon is more than a mile deep. A mile standing on end; an avenue tilted up vertically for twenty city blocks; the country road from our farm to the postoffice running straight up into the air or straight down into the earth for that whole mile! One grasps that, with the directness of an unexpected blow. And can it possibly be eight or ten miles across to the level plateau beyond the canyon? The knowledge of the depth helps in appreciating this.

the depth helps in appreciating this.

But what made the canyon? "Surely the river did not," we would naturally say: "Why it would have taken thousands and thousands of years."

Yet geologists have proved that the river did carve the canyon, and they call it a "young valley" despite the enor-

mous time its cutting required. They demonstrate that the Grand Canyon is not a gaping crack due to the breaking of the

They call attention to earth's crust. the side canyons, the gorges that join these, and the still smaller tributary chasms, all of them proportional in size to the streams within them. They point out that streams in all parts of the world are cutting into rock and producing smaller gorges with characteristics exactly like those of the Grand Canyon. They ask what would become of the many cubic miles of solid rock if the canyon were due to a yawning of the earth's crust. They clinch the matter by calling attention to the fact that there are enormous breaks in the rock (faults) in the Grand Canyon region, but that none of them form chasms and that the streams are without exception in ignoring such faults.

True, then, the Colorado River did make the Grand Canyon. Its affluents made the tributary canyons. They did this by cutting down. But what widened the canyon to its present form? What produced those buttes and towers and temples and thrones, the forms that simulate castles and cathedrals? Another process, namely weathering, worked hand in hand with the stream erosion. With every change from the heat of noonday to the cool of midnight, from the warmth of summer to the chill of winter, the rock expanded and contract-ed. With every change from the dry-ness of pleasant weather to the dampness of a stormy day, the rock acquired or lost moisture. The contraction and expansion weakened it mechanically. The dampness brought about chemical changes. The wind attacked the rock. The roots of plants broke it open, its surface became loosened, fell away under the influence of gravity, exposed new surfaces to weathering. Thus the new surfaces to weathering. Thus the canyon was widened, thus the buttes and temples were fashioned. Of course, this took long, long ages. Yet the time required for making the canyon and its ornamental features, though long in years, was short in comparison with the million years or so that will be required for widening this young canyon into a mature valley like that of the Mississippi. The time is briefer still compared with the ages it took to form these rocks in the sea and to make the mountains in which the Grand Canyon is cut.

# A Great Painter's Description of Nature's Grandest Piece of Sculpture

Photographod for Pistured Enousedge from the Original Pointing in the Capital at Washington.

The Chasm of the Colorado, by Thomas Moran

mountains climbing up the sky. Then the smoke plumes of the volcanoes are seen, drifting across the sun, the snow-caps gleaming like opal-colored clouds."

NY boy who has read Robinson Crusoe knows that islands are not just "sma of land entire by water." W Why, Great

are island empires, with millions 'the water; on rising coasts they of people, and even the smallest islands are so strange and romantic that they are put into story books. Anything can happen on one, from shipwreck to pirates and buried treasure. So aren't you glad that the United States owns a number of islands so far away that we shall have to go half-way around the earth to find some of them?

### Nature's Various Ways of Making Islands

First, let's take islands to pieces

and see how they happened. Those neighborly ones which lie along our · made in sev-Where ays. ills and high en left out in

have been only partially lifted above the sea. South of New England, islands of gravel and boulders were dropped in front of the great glacier which once covered the northern world. Storm waves heaped up sand bars along our South Atlantic and Gulf Coast; and colonies of little sea animals have built up coral islands in the warm, shallow water around Florida. Newfoundland. Vancouver and the coastal islands of Alaska were lifted, as was the

Who Will Buy My Oranges?

The West Indies look like stepping stones across a brook. If lifted above the sea their long plateau base would form Stebbing Stones Across mighty curving bridge, the Sea much wider than the

Isthmus of Panama, from South America almost to Florida. All our mountain systems first appeared above the water in just such chains of volcanic islands.

### Why So Many People Live on Islands

Isn't it odd that these archipelagoes, lying as they do, thousands of miles apart, should be so much alike in climate? All on or near an east and west line with Mexico, are hot, rainy lands. Green, flowery and fruit-laden, where little clothing was needed, and food

dropped from trees, they were all thickly peopled when discovered by white explorers. Friendly Carib Indians were in the West Indies, and bright, teachable tribes of the brown race on the Pacific islands. These native peoples are still in their old, island homes, mixed in with and changed by the white, black and yellow people who came to live among them.

The West Indies are such near neighbors that we have always known and loved them. As soon as the Puritans could build sailing vessels they went to Cuba for sugar. But Spain did not own all these is-Wanted for naval bases and colonies by the early sea-faring nations, they were seized, settled and fought over by Spain, England, France, Holland and Denmark. there are, today, the greatest differences in the people, language, customs and development of neighbor-

> ing islands. Slavery was introduced into many of them and Cuba, Jamaica and Haiti have large negro populations. While Cuba is now an independent republic. and Porto Rico is under the United States flag, the people are still mostly Spanish, native Indian and Negro, and speak the Spanish language.

All aboard, now, for our beautiful little tropic isle of Porto Rico. From New York or Florida, a steamer has to skirt the Bahamas---that large group of coral islands on the

Continental Shelf, where Columbus first landed on San Salvador. There the water is so shallow over the sand that beautiful gardens of the sea are visible through glass-bottomed row-This made Columbus believe that he was near the coast of China. Then he suddenly found himself in deep water again. South of the Bahamas the ocean-floor drops to a wide valley, to rise again in the steep rock cliffs of the West Indian plateau. Off the north coast of Porto Rico the Atlantic is 24,000 feet deep. Above the water our island rises to a height of 4,000 feet. What a mountain Porto Rico would make if it were all above the sea: Yellow-

stone Park piled on Mt. McKinley!

This is a Porto Rico farmer by making "pin money" by ped-

boy making 'dling oranges.

## ■OUR ISLAND POSSESSIONS ■

A Domestic Science Class

The Best Way to Improve Porto Rico

ocean, to mountains whose heads were lost in the clouds, had never before been heard of. And to those The Columbus islands, which had every fruit of the tropics and of the every swimming and shell fish of the sea, he gave a population of four hundred thousand friendly natives. Near cousins of the Filipinos, they called themselves Kanakas, and were described as a handsome people, of the dusky redbrown of tarnished copper. They dressed in loin cloths and skirts of paper-mulberry bark, wore flower garlands on their heads and necklaces of seeds and shells. house and boat builders, farmers and fishermen, they swam like mermen, and cruised about the islands fearlessly in their frail canoes.

These Kanakas became Christians, learned the ways of white men, formed a government with a native king, and traded with the early miners of California. But civilization did not agree with them. In one century their number was reduced to 40,000, and four-fifths of the people on these islands today are of other races. Most of the Kanakas are educated and speak English, and many of them are rich sugar-planters.

The Hawaiian Islands are often called the "half-way house of the Pacific." In all that six-thousandmile-wide ocean here is the only stopping place between the western ports of North America and Japan, China, the Philippine Half-Way House of the Islands, India and Aus-Pacific Ocean tralia. We were very glad when the people of these islands formed a republic and asked for annexation to the United States. They needed the protection of a big nation, and free trade in our markets, and we needed a cable station, a port of call for vessels, a naval base in Pearl Harbor near Honolulu, and Hawaii's big sugar crop.

### Approaching the Hawaiian Fairyland

To tourists on ship-deck, when still far out at sea, these islands first appear as fairy mountains climbing up the sky. Then the smoke plumes of the volcanoes are seen, drifting across the sun, the snow-caps gleaming like opal colored clouds; and below these, emerald slopes of tropic beauty fall in drapery folds to gray, rock precipices, which spring straight up two thousand feet from a foaming sea.

This chain of eight islands and four rocky islets, whose peaks rise to a height of from one to three miles, rests on a small plateau that has been pushed up from an ocean basin six miles deep. That is a total lift of 45,000 feet! And the forces which caused this greatest upheaval on earth are still at work.

How the Volcanoes active volcanoes, many Feed the Land dead but fire-scarred craters, and hundreds of square miles of mountain sides covered with barren lava rock. The deep, fertile soil which blankets all the gentler slopes, valleys and lowlands is made of lava dust and decayed tropic vegetation.

Every island, however, is different, and the two sides of any one island are unlike. The mountains stand in such lofty, east and west ranges that rains from the north are stopped. So the windward sides are wet, green, and cooled by breezes from Alaskan glaciers, while the leeward sides are hot, dry and barren, except where irrigated from mountain snows. Maui and Oahu

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One-fourth of the two hundred thousand people of these islands live in the capital and chief seaport, which has million dollar hotels, palace homes in private parks, miles of palm-shaded boulevards and ocean drives, processions of automobiles, and shops where you can buy diamonds and Paris gowns. Hawaii is a colony of rich planters, and most of the large land owners have homes in the city. And there is as strange a mixture of races as is to be seen in Hongkong, China. Americans, Englishmen, Kanaka princes, Chinese and Japanese own the land, run the banks and importing business, and mingle in the social and official life of the island; and in the fields, markets and shops, Japanese, Portuguese and Kanaka laborers, gardeners and fishermen work side by side.

Citrus fruits, rice, coffee and pineapples are grown, but three-fourths of all the cultivated land is in large sugar plantations that are worked with the finest machinery and wellpaid labor. The raw sugar is sent to refineries in San Francisco, and is the basis of an island trade of \$50,000,000 a year. With their balmy, sub-tropic climate, scenic beauty and grandeur, and the wealth that pays for luxurious living, the Hawaiians are called "The Paradise of the Pacific." Honolulu

charming city in which to spend a winter holiday. On its sandy beach there is sea-bathing every day in the And by palmyear. A Perfect Wilderness shaded motor roads you of Beauty can drive all over the low mountains, where every field is in fruit or sugar, and every wayside is a lovely tangle of the tropic plants of three continents—America, Asia and Australia. Palms, tree-ferns and screw-pines grow together with ironwood, sandalwood, blue gums, bamboos, silver wattles, bananas, guavas, orchids, thickets of scarlet hibiscus, a hundred delicate ferns and a thousand small, flowering With no swamps there are no reptiles, and birds are not numer-But oh, the wild gardens! There are ravines that look like botanical parks of rare plants.

The first things you see, as you steam into Honolulu Bay, and the last, as you leave the islands behind, are native fishermen in their fleets, and boy swimmers in the surf. With the rising tide, waves Tobogganing on the fifty feet high roll in Combers shore. Balanced on boards, these skillful and fearless swimmers, brown, yellow and white —and the Kanaka boys are the best of all—ride these dangerous combers as easily as you toboggan down a snowy hillside.

### The Island of Guam

And native fishermen in gaily painted boats, paddling with shovel-shaped oars, or trimming their sails of brown matting, are the first things you see as you approach the island of Guam. This is little more than a mountain range thirty miles long, but here the United States has coal-docks, repair shops, a mail and cable station, and a company of ma-

rines in the naval base. All the trading and colonizing nations— England, Germany, France, Hol-Why Big land, and Japan—have Nations Need islands on the lanes of Little Islands ocean travel. Some that we own—the Midway and Wake Islands, and the Samoans in the South Pacific—are only dots of green in blue seas, but they are valuable as

# PICTURED KNOWLEDGE

# the Igorrote Rice-Growers Build Their

rramid in the center is nine bundred feet high and of granits. There is a rice field the island of Luzon.

# Farms Along the Sides of the Mount

on each terrace. The houses of the Igorrote rice-growers can be seen on the summit. It is in a

part of the same system as the mountains of Japan. Even the smaller islands have central north and south ridges, and peaks which drop steeply to the sea; and the larger ones have extended ranges with volcanic cones rising to eight and ten thousand feet; broad, interlying valleys, and slopes which descend to coastal plains. Earthquake shocks are frequent, just as they are in Japan; there are some active volcanoes and several regions of hot, mineral springs.

that they are drenched with tropic vegetation, too. Floods of green plants, foaming with rainbow-colored blossoms, roll down in cascades from every mountain crest. All the lowlands that are not in Wealth of rice, corn, cotton, tobac-Products of the Rick Soil co, sugar, manila hemp, fruits and indigo, are covered with jungles of palms, bamboos, banyan trees, shrubs, vines, grasses and small flowering plants in bewildering variety and beauty. Oranges, bananas. bread-fruit. cocoanuts. :

### OUR ISLAND POSSESSIONS

ful and healthy, fortified capital on think that the "Filipinos" ought to Manila Bay, several smaller sea- become enormously rich. But think

ports with improved harbors, good a minute. White people cannot work

schools. a n organized government with ample revenue and no debts. hundreds of miles of railroads and thousands of miles of telegraph line, ocean cables to China, Japan and

the Hawai-

ian Islands.

A Glimpse of the Tropical Philippine Jungle

at all in that steaming heat, and brown ones must take life easy. Countries are much like people. It is not the tropical lands cramm e d with natural wealth that grow rich, as a rule, although Ha-

This native Filipino is cutting up a log in the depths of

developed

industries, and a large trade with waii is an exception, but the poor, the United States, England, France cold, sterile countries like New Eng-

and China. Larger crops of every kind could be grown. Cattle could be grazed onmountain pastures. There are unknown quantities of coal, petroleum, copper, gold and silver, lead, marble and pottery clays in the earth; and gums, dyes, spices, cabinet woods and ship-building timber in mountain forests that are almost untouched.

A Tree-House in the Philippines

land, where people can work hard, and where they are obliged to use all their wit and skill in order to make enough to live

So, back of the seaports in the Philippines, except for the Spanish churches and American schools and improvements, the Filipinos live and will continue to live much as they did four hundred years ago.

In some parts of the Philippines the natives are still savages. Some of them build tree-houses like this one as a protection against enemies.





COME little girl you know is sure to have a string of coral beads. They may be a deep honeysuckle red or the palest, shell pink. Coral is a kind of shell. It is the skeleton house of tiny sea animals that live together in colonies. For a long time people thought the coral a sea flower, for it is rooted fast to a rock, and Little Houses colored rays are set Around Your Neck about its round mouth in a flat circle like petals. On the Florida coast people go out in glass bottomed boats and look down on beds of blossom-like corals.

Each little animal is just a short tube, the upper end looking like a tiny sea anemone. The lower end is fastened to the coral rock by a lime ring that is made Peoble Who in the body as bones Their House are made in our bodies. All over the branching, brainshaped, star, sea-fan or sea-plume, coral rock, the little animals are set at regular intervals. Food is taken from the water that flows through the mouths. This is carried from all the members of the colony to every other through a jelly-like membrane that connects them. The shell is formed under the animals and the membrane, making sometimes a smooth layer, sometimes a ring pitted one. Just think of sharing your backbone!

# CORALS AND CORAL ISLANDS • Flower-Like Corals

Pacte by
Pac
carrie
atinct
trates
by a

a time, for this is a is sort of fairy tale, like that of Exercions Piece Co. finding a precious jewel in the toad's head, the United States found a big, rich country on the bargain counter. Its 576,390 square miles of land was marked down to \$7,200,000. There is a

problem in arithmetic for you.

How few cents is that for an acre?

see now many or

But everyone thought
that Alaska
would be
dear at any
price, just
a dark,

frozen, worthless land, pushed away up and out into the North Pacific and Arctic Oceans. When Captain Behring, a bold Danish explorer in the service of Russia, discovered this land in 1741, he found no more than 30,000 poor Indians living along the south-

## PICTURED KNOWLEDGE The Midnight Sun

an summer the sun shines far into what woult sun, at one period of the year, seems to move we the horizon. If you do not know why the rotation and revolution of the earth.

1867 Russia had another in the c ll settlement—a id Indian misitka-on one of r islands. The States bought use we did not ies to own any We thought

country. Since to protect the se them to map tl and to search wealth, They acres of valual the mountain sl

coast: fishing banks of cod, herring.

#### M ALASKA MAN

## 1 Stair," Chilkoot Pass

M ALASKA

**fficulties Confronting Alask** 

Snow blockades are a great source of trouble to Alaskan railways. The snowplow cleaning the track of fifteen-foot drifts. Notice how far it the

Coming into Camp at Night

ndian Village	

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clear up to the Arctic Circle. And they live in Nome on the bleak shore of a sandy peninsula below Behring Strait. People can travel, too. Twice every winter the mail-carrier races his dog team up to Point Barrow, where whaling vessels lie frozen in an Arctic harbor.

A 11 nature wakes up in May. The tundra, or frozen, mossy marshes which cover all the lowlands of Alaska, thaw a few feet and have a rank growth of reindeer moss, coarse grass, brilliant flowers, and wild bushes. berry Birds appear and fill the leafy woods of the Yukon River bottom with song. ice is all out by Then lune. steamers come up from Seattle with goods and workers, and river boats swarm up to Fairbanks, Eagle, and Daw- Photo by Harry & Champlin, Jr. Since all the Even the

worth five dollars a bushel and hay eighty dollars a ton.

#### Now All Aboard for Alaska

Now we will go and see this northern wonderland. You, too, as we steam along the coast, will want to stay on deck as long as the light

A Roadside Warehouse

lingers, and will grudge even the six hours given to sleep. We take a steamer at Seattle. With flags flying and band playing, the floating white palace moves out of the harbor. Clearing Puget Sound, it skirts Vancouver Island, about which we told you in the story of Canada, and seeks the water valley of the "Inside Passage."

Most to urists are content with eleven-day the round trip to Skagway, seeing only the "panhandle" of Alaska. But that has four hundred miles of the most beautiful mountain shores to be seen from the deck of To the a ship. west lies a continuous chain of is-

lands whose wooded slopes and snowy domes rise a mile above the sea. The mainland coast is beachin August, and that potatoes are less, the mountains springing from

work of the year must be done in four months, everyone works eighteen hours a day, while the sun shines. Even the Indian medicine man standing beside a cache

farm crops grow faster where the They seem to days are so long. know that there is danger of frost

# ■ ALASKA ■ Fox Changes H

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Polar Bears in Their L

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#### The Discovery of Alaska

(From the Speech of Charles Sumner on the Cession of Russian America to the United States.)

Behring first saw the continent of North America on July 18th, 1741, in latitude 58°28'. Looking at it from a distance "the country had terrible high mountains that were covered with snow." Two days later he anchored in a sheltered bay near a point which he called from the saint day on which he saw it, Cape St. Elias. He was in the shadow of Mount St. Elias. On landing he found deserted huts, fire-places, hewn wood, household furniture, an arrow, edge-tools of copper with "store of red salmon." Here also several birds unknown in Siberia were noticed by the faithful Steller, among which was the blue jay, of a peculiar species, now called by his name. Steering northward, Behring found himself constrained by the elbow in the coast to turn westward, and then in a southerly Hugging the shore, his voyage was constantly arrested by islands without number, among which he zigzagged to find his way. Several times he landed. On one of these occasions he saw natives, who "wore breeches of seal-skins, caps of the skins of sea lions, adorned with various feathers, especially those of hawks." These "Americans," as they are called, were fishermen, without bows and arrows. 'They regaled the Russians with "whale's flesh," but declined strong drink. One of them, on receiving a cup of brandy, "spit it out again as soon as he tasted it and cried aloud, as if complaining to his countrymen how ill he had been used."

"That Giant With the Seven-League Boots Could Almost Step Over It"

A T the notice of North State of Panama separates the Atlantic from the Pacific Ocean. It lies across a great water trade route like a landslide

across a railroad track.

To go around Panama means a voyage of ten thousand miles, down to the end of South America and up again. To cross it looks easy. That giant with the seven-league boots could almost step over it. But here Nature has heaped up so many troubles for travelers that Spain, France

useful if it

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men of vision and daring. No task looked too big to them.

### Mountains, Swamps, Jungles and Eleven Feet of Rain!

"There be mountains," indeed, and other difficulties to daunt the stoutest heart, in Panama. The tipend of our great western highlands, we find here the same central plateau and a true mountain range. To be sure this pygmy Easier to Dream Than table-land is only thirtytwo miles wide eighty-five feet high, and the ridge which springs from its western edge rises to a height of only five hundred and thirty-four feet, but it is a part of the rock-ribbed, earthquake-lifted backbone of the conti-As elsewhere, from Alaska southward, the slope to the Pacific is short and steep. The eastern slope descends to a region of rough foothills on the plateau, before it drops to the sandy swamp which borders the coast.

In this hot, sea-washed land, eleven feet of rain falls every year. Storms from the Caribbean sweep Swamps, Jun- right over the low moungles and Eleven tains, drenching the Feet of Rain isthmus and causing a dense growth of tropical jungle nearly everywhere. The eastern coastal belt, for a width of six or seven miles, is bottomless swamp. Above that, the foothill valleys of the plateau are netted with swollen streams that, uniting, drop in raging little torrents to the sea. Chagres River, before dammed back by the canal builders, and made to spread into a lake on the plateau, often rose forty feet in twenty-four hours. "There be mountains," floods, swamps, poisonous snakes and insects, and steaming

jungle in Panama for men to con-

The Spaniards did cut and burn, hew and bridge, and keep open a royal road between the fortified cities which they built at Panama and at San Lorenzo at the mouth Their ships were of the Chagres. Spanish Traf- SOON the Pacific on bringing treasure from c Across the Isthmus Western Mexico, Peru, South America and the Philippine Islands. Treasure was carried overland and supplies returned by muletrains of hundreds of laden animals guarded by soldiers. Indians and English pirates often attacked and robbed these trains. The early story of Panama was one of splendor and violence.

#### The Sluggish River and the Jungle

On the lower Chagres River you can, today, see the stream they navigated, and the tropic forest through which these Spanish adventurers broke. A power-boat takes tourists for a trip westward for ten miles along the coast from Colon, to see the vine-smothered ruins of old Fort San Lorenzo. From there it chugs up the river to Gatun Dam which has been built across the stream on the edge of the plateau.

A sluggish river, now that it has been tamed by the dam, it flows between the green walls of the tropic forest which springs from the water's There are no banks. A rise edge. of twelve inches floods the border-At all times, mangrove ing land. trees wade out on their stilt-like roots, on which snakes and alligators sun themselves. Those forest walls, which rise higher than the two-hundred-foot width of the river, look to be only screens of green and gold lace—ferns, sensitive plants, flowering shrubs, delicate creepers and slender saplings. But from earth to tree-tops, there are shafts as tall as light-houses, with gleaming, san-

dle-like blossoms -everything is woven into a mat by vines as tough as wire and rope. and beset with thorns and prickles. No man or large animal can force a way through. Above are brilliant birds. monkeys and climbing snakes; and below, in the moss and fungicarpeted bog, are alligators, lizards and other reptiles. And such color! Bright purple and vellow trees, thickets of scarlet hibiscus, and orchids in airy, multicolored flocks like butterflies. Swarms of stinging insects, in burnished metal colors, are thrown out upon the for-

est screen like spray from a sea of life. It fills the eye with dazzling beauty and the heart with fear.

The natives of Panama, and ninetenths of the four hundred thousand people of this little republic, which is smaller than the state of Indiana, are still of Indian or mixed blood. You can see them on the Chagres in the cayucas, or hollowed treetrunk canoes, such as they used in Balboa's day. Sitting carelessly, or even standing erect, they propel these boats skillfully with long poles braced against trees or the river bottom. They even venture out in

A Lighthouse in the Forest

foaming floods and shoot dangerous rapids. They build their palmthatched huts on upland bluffs and, planting a few banana trees and cultivating a patch of yams, take life easy. What little money they need for their scant clothing can be made by catching parrots for the northern market; hunting the iguana, an edible lizard; fishing for the shell tortoise and diving for pearls on the west The Spancoast. ish people are traders in the coast towns, or they grow coffee, vanilla beans or indigo, manage stock farms, or gold operate -

mines in their primitive way.

#### The French and the Canal

These people, too, like the Mexicans, won their freedom from Spain and then impoverished themselves by long civil wars. With some such leader as President Diaz they might, themselves, have built the railroad which an American company carried across the isthmus after gold was discovered in California in

## A Big Dipper Dredge

Thirty-four men are standing in the cup of this hydraulic dipper dredge. The dipper can pick up, in one mouthful, fifteen cubic yards or twenty tons of soil. It is eleven feet high and the arm carrying it is seventy-two feet long. Beside cutting down the side of a bill, the dipper can dig out soil fifty feet under water. This dredge has another dipper of ten cubic yards capacity. There were two of these monsters at work on the Panama Canal, and together they took out about six hundred thousand cubic yards of material a month.

for such bulky things as wheat, lumber, coal, rice, crockery, cotton, machinery and furniture. With a shortened voyage many useful things could be carried cheaper by water. Besides, in a big war, we might need to move our naval vessels from one ocean to another very quickly.

Here was the "big job" that could be done only by a big, rich, energetic and inventive nation. So the United States bought the Panama railroad, and the canal works and Purchase of rights of the French owners, paying \$40,000,Zons 000 for them. And we paid \$10,000,000, and a yearly rental of \$250,000 to the Republic of Panama for the privilege of finishing the waterway, and for the lease of

#### The Panama Locks and the

The central board from which the lock mechanism is operated.
 The board is a minis-ture reproduction of the lock it controls.

2. The gate-opening machine which is started and stopped from the control boards.

3. A conduit for electrical connections.

This model of the Miraflores lock shows bow the great water gates are opened and shut to let the ships through and how the water is controlled so as to help them climb up the water stairways and then climb down again.

and then climb down
again.

The "operating
board" at 1 has on
it what you might call
"toy" reproductions of
each part of the machinery; a kind of picture language which
will help the operator
to remember just what
he is doing. One of these little reproductions
is called a "chain fender." This chain, under
the operator's eyes, rises and falls with the
big lock chain shown at 7. Another device has

a slab of blue marble, to represent the water of the lock. Across it reach the leaves representing the big gates; and they open and shut just as if they were consciously imitating the

# Wonderful Mechanical Brain

- 4. The transformer room.
- 5. An electric towing locomotive,
- 5. The lock gate. The intermediate
- 7. The hydraulically operated fender chain which prevents the ship from colliding with the lock gates.

locomotive has similar indicators to show the pressure of steam and the amount of water in the boiler. But—most wonderful of all—is what might be called the "automatic brain," that part of the mechanism which compels the operator to move his levers in just a definite order. He cannot make a mistake. All he is needed for is to set the machinery in motion when needed and to stop it. This "brain" is underneath the control board, and is called an interlocking system. Step No. 2 can't be taken until Step No. 1 is finished, just as you can't open a door until you turn back the bolt, and you can't turn the bolt until you insert the key.

big water gates. Another device is like a thermometer—a tall, slim tube, in which an indicator rises and falls as the level of the water in the canal rises and falls. The engineer in a

## PICTURED KNOWLEDGE

gates are opened. Three steps lift the ship eighty-five feet. On leaving the last lock the engines start again and the vessel is off, full speed, for the twenty-four-mile run across Gatun Lake.

To the right, as you enter the lake, you can see Gatun Dam which

of flood waters into the lower Chagres. The dam was filled in with rock and earth blasted out of the foot-hills and the mountain range.

In crossing the lake the Canal makes eight turns, following the old valley of the Chagres River, where a channel five hundred feet wide has

A Baseball Game Under the Palm Trees

The blistering, tropic sun is not too hot for the enjoyment of baseball. The trees surrounding the diamond are coccanut palms. The picture was taken at Toro Point and shows a hotly contested game between the Culebra and Toro Point teams, in which the former won.

holds all these waters on the plateau. An enormous embankment a mile and a half long, it connects two natural hills. At its center is a nother hill, whose solid rocks have been pierced and lined with cement, to make the spillway for the escape

been deepened to forty feet. Ships are guided by range-lights, in pairs of concrete towers sixty feet high, as The Brilliant are automobiles by arclights on a city boule-boulevard vard. All the lamps are on one circuit and are lighted by pushing a button. The electricity

for lighting the Canal, operating the hidden machinery of the locks, and running the towing locomotives on the walls and partition of the locks, is supplied by the water-power at Gatun Dam. At night the Canal, from ocean to ocean, is a brightly lighted water boulevard, bordered by the beautiful tropic wilderness. A palm-thatched hut perches on every hilltop, the cayuca darts in the wake of the steamer, groves of drowned trees lift their heads above the waters of the lake, quite dead but still draped with vines and Spanish moss.

### Through the Famous Culebra Cut

From Gatun Lake the Canal passes into Culebra Cut. This is that mighty rift in the mountains. Three hundred feet wide at the bottom, it slopes up to towering cliffs that are, already, covered with tropical vegetation. Dynamite blasted out the rock here, rending the ridge like earthquake shocks. Those explosions may have loosened layers of clay and soft stone, for there were troublesome landslides.

Through one lock our ship drops down from Culebra Cut to Lake Miraflores, two miles wide. Two more locks lower it to tidewater. From the Canal we can see Balboa Hill which the explorer climbed to Now Down "stare at the Pacific." It overlooks the bay of San We Go! Miguel, and the new American port of Balboa. A trolley line runs down the coast to Panama City, the old Spanish capital, a

ragged, gay, bright-colored, degenerate old tropical town; but cleaned, drained, paved and healthy for the first time in its four hundred years of history.

#### Balboa, the Canal, and the Future

It is believed Balboa will grow up into the greatest of all tropic seaports. Here are docks for ships, dry-docks for repairs, coal docks, machine shops, warehouses, a naval station. And out on the three islands which guard the bay the United States has forts to defend the Canal.

Look back as you steam out into the Pacific. The shore seems to spring abruptly from the water. There is no sand beach, no jungle. Pearl divers drop from boats into the bay. Cattle graze on the clean, grassy slopes. There is gold in the From the mountains. Spread of the Shipping bay the ships spread Routes like the ribs of a palmleaf fan, going north, west and south, to California and Alaska, to China, Japan, the Philippines and to South America. Seven hours, now, to cross the Isthmus by our water bridge, and they are away again to all Pacific ports.

Here is the stage setting for a great drama of human achievement. It was there to be conquered. For four centuries it enlisted dreams, genius, courage, sacrifice, treasure, wounds and death. In all its lovely length our Isthmian waterway is guarded by the memories of brave, devoted men.

a map of a Canada, is the great si country, and it line on three northern 1

wastes, fit only for the home of the length of the land.

a few Eskimos and polar anieast to west there are islamated a peninsula with seaport the southern parts that border the long valley, broad prairies the most beautiful region of Lakes.

But that strip is larger than it looks to be. In some places it is hundreds of miles wide, and it is nearly four thousand miles long. takes a journey of five fastest trains, he harbors on great inland s along half

the length of the land. From east to west there are islands and a peninsula with seaport cities, a long valley, broad prairies and the most beautiful region of lofty,

An Empire wooded mountains in America. Cities, towns,

Wealth farms, cattle ranches, fisheries and mines make work

■ DOMINION OF CANADA ■ hills of the Canadian Ro

### PICTURED KNOWLEDGE

s, still covered lands summer resort, near Lake sec, the early Ontario, and on to Niagara Falls.
an old-world Or they can go into the lake-dotted this. Along the woods to camp and fish. The best

Beautiful Emperor Falls

<sup>.</sup> the mantle of forest can be seen ice rivers far up the rocky gorges, and lonely cascades that seem to fall from the clouds." This is Emperor Palls, flowing from beneath

## DOMINION OF CANADA

# Cathedral Peak and the Shoulder of

icking Horse River and enlarged by a glacier which 0,284 feet above sea level, or nearly 6,000 feet above cause the rocks are horizontal; and its castellated and at cut into it and to the action of frost and weather d, therefore, retains the form that suggests a ruined in the foreground was rounded and smoothed by the

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steamers, pleasure boats, and vessels
    loaded with wheat, lumber and iron.
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    Westward from Lake Superior a
ιe
    train runs across hundreds of miles
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# Jolly Winter Sports

### DOMINION OF CANADA

draped with dark forests. Between the ranges are deep valleys, in which lie sheets of still, dark water. On the slopes, that border these mirrorlike lakes, are the blossoming orchards of great fruit ranches. Through every break in the mantle of forest can be seen ice rivers, far up the rocky gorges, and lovely cascades, that seem to fall from the clouds.

For hundreds of miles the railroad loops and twines around the peaks, and skirts the lakes and the brinks of precipices. At Banff there is a great national park, of six thousand square miles of mountains covered with the giant Douglas fir trees. There the elk, moose, buffalo, bear, mountain sheep and other native wild animals live undisturbed. As the Frazer River drops down its gorge to the ocean, Indians can be seen fishing for salmon, and Chinamen washing the scanty gold of old mines out of gravel.

The train runs down a steep slope to the coast, across a strait, and out to the big mountainous island of The Beautiful Vancouver. A beautiful, Island of warm, moist land—flow-ers bloom in its wave-washed gardens all the year around. And there the Pacific Ocean liners can fill their bunkers with coal and steam away to the South, to the North, to the West, to Panama, Alaska, Japan and Australia.

Editor's Note.—Mother and teacher are reminded that the early scenes of Longfellow's "Evangeline" are laid in Nova Scotia, the "Arcadie" of the French. Ernest Thompson Seton is a Canadian writer, and his animal stories have, in most cases, a Canadian setting. Older boys can find clean stories of adventure in Ralph Connor's "Man from Glengary" and Stewart Edward White's "Great White North."

# The Statue of Charles IV in Mexico City

"Mexico City rose from its old Artec ruins and Spanish lethargy. It was bonlevarded and parked, and filled with splendid public buildings, fountains and statuary." This is the big statue of Charles the IV of Spain, who banded over his people to Napoleon in such an ignoble way. It is a high, commanding statue, on one of the boulevards of Mexico City, and weighs fourteen tons.

MEXICO
and the
States of
Central
America are
our nextdoor neighbo
south, or rathe
for the Gulf
Sea here take
of the contin
clear across the Mississippi Valley. For their share of North
America these countries have only

western highlands.

Mexico is so simple in shape

the tapering southern end of our

and structure
that any
child could
model it on a
sand-table.
He would
o do it, too; for
ntry, which is
long, and from
e hundred and
nas the form of
the cornucopias that

The Two the cornucopias that

Horns are hung on Christ
of Planty mas trees. One of

Mexico's nicknames is "horn of

plenty." And from the tip of that

horn is dropped a smaller horn

that is filled with the seven prize packages of the Central American republics and the British Colony of Honduras. As if to hold their treasures in, the sides of both cornucopias are built up with mountains. And from end to end they are deco-

rated with tropical birds and flowers, sparkling with snow-capped peaks, crammed with "goodies" to eat, and gilded with sunshine and with gold and silver mines.

## Lands of Few Rivers and Harbors

Perhaps you can figure out why there is no large river system. The Rio Grande. on the boundary, is really a United States river, rising in Colorado and fed chiefly from the north. The countries are all so narrow that there is no room to form

great rivers. The central plateau gets very little water besides that which drains into it from the moun-This forms lakes, most tain crests. of them salt, because they have no outlets. Nicaragua has Why the largest of the fresh Rivers Are Scarce water lakes. Even little Panama has a fine artificial lake that We'll tell you is very important. about that in the story of the Panama Canal,

Down the outer slopes of the

mountains many small streams drop in beautiful falls and rocky rapids. On the eastern side they loiter across the narrow coastal plain to the Gulf and Caribbean Sea. Except for rafts and the smallest craft, none of them are navigable, nor do they

A Mexican Water-Carrier

SCOUF out deep mouths to form harbors. Only by spending much time, money and engineering skill, were deep harbors dredged out at Vera Cruz, Colon, Panama, and other sea-None of ports. these countries offered a wide and easily opened door to the Spanish explorer.

Now you may think that it is very hot everywhere in these countries. The Tropic of Cancer crosses the middle of Mexico, which means that the sun, in mid-summer, crosses the

sky directly overhead. And the sun stands as high here in winter as it does in New York in June, for the tip of Paname lies within six degrees of the equator. But, you know, it is always cooler on mountains. From Central Mexico to Nicaragua the plateau rises to eight thousand feet in height, and numerous snow-covered and smoke-plumed volcanic peaks run up to seventeen thousand feet. Only the narrow coast low-lands are really tropical. With

In dry, hot countries, water is a salable commodity. Notice the sandals of this water-carrier.

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# The Old and the New

# **■ MEXICO** ■

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ve per able, l
ll illit- he dev
tly the country
mixed in ord

The Poons at Play

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# IN THE GREAT WORLD OF NAT ASTRONOMY

smile when

they hear that simple rhyme. Just two kinds of people say it seriously—very wise men and very little children. Little folks have

Whet Your curiosity and imagination. And wise men Do for You are careful not to lose these precious things when they grow up. It is round-eyed wonder that has found out all the beautiful secrets of the earth and sky.

The first thing in the sky at which you wondered was the moon. Did you ask mama to get it for you? You thought it was in the tops of the trees. Then you saw it was 'way, 'way up, a golden ball.

## No Wonder the Moon Is So Neighborly

The moon is our nearest sky neighbor, for it is only two hundred and fifty thousand miles away! The sun is ninety-two million miles distant! We can learn many things about the sun, moon and farthest stars by looking through a telescope. A tele-

the lens only it is wide.

### Night

The place! I sunshine little bo

Where Nobody Is Ever "At Home

big yell globe o and dar

# Who "Th

A wa over stomountai valleys. deep ho man-in-mountai ows, an wide.

Don't

The lamp is the Sun, in the center of the Moon's orbit is the Earth and the balls show the Moon in its various positions. Note the new moon, second quarter, third quarter and full moon.

can shine with such a soft light? There are two ways in which A lamp flame things can shine. glows with its own light. A looking glass reflects the flame. The moon is a mirror for the sun. Why Shiny Our earth is another Shoes are Like the mirror. A grain of dust  $M_{oon}$ in a sunbeam, a polished table-top or stove, or polished shoes all reflect light. A vapor cloud is a beautiful mirror, and so is a pool of quiet water. Some of the stars in the sky are suns, shining by their own light. Some are dark globes of planets and moons; some glowing vapors and whirling masses of star dust.

### How the Earth "Leads" the Moon

The moon circles around the earth and moves with it around the sun. It is like a little dog led by a string.

But It The string is the pulling power of the earth. The moon pulls back, but cannot break loose. So the sun pulls the earth, and the earth pulls away. All the stars that you

see are pulling and being pulled, and so are held in their places.

# What Makes the Moon's Changes

The only side of the moon that can shine is the side facing the sun. Once every month it is so near the setting

Such a shining face at all. In a day or two we can see the narrow, western edge

of it, gleaming like a crescent of pearl. Every evening, as the moon moves eastward, farther from the sun, we see more of it. In two weeks the full moon comes up in the east, after sunset. Then the western edge is darkened. It takes the moon four weeks to travel around the earth. In the last quarter we can sometimes see the moon in the sky in the day time. Its bright edge is then on the eastern side.

### An Enormous World in Flames

We cannot look at the sun except through dark gray or smoked glasses. It blinds the eyes with its glare.

The heat of the sun is greater than any heat we are able to make on earth. Thousands of times bigger than the earth, it has an e-nor-mous center of molten mat-

an e-nor-mous center of molten matter, and all around it glowing vapors or gases. Scarlet flames, thousands of miles high, leap up and roll around the sun, topped by crimson In places the sun sputters, as when water falls into a kettle of hot lard. This makes dark spots that seem to move across the face eastward, disappear and return on the western edge. By watching the sunspots astronomers have learned that the sun whirls from west to east, just as the earth and moon do. It takes the sun twenty-five days to turn around once. It was long thought

# OUR NEIGHBORS IN THE SKY

# How You Can Measure the Mo

# PICTURED KNOWLEDGE

it is in eclipse;
oon gets in bene sun and the
Then, all around
e of the black
hat covers the
ght, of dazzling
red jewels of
that long bany into space.

Eclipses are photographed. The light rays are caught in glass prisms and spread into rainbow bands of color.

# Why the Sun Is Your Grandfather

Did you know that our good Mother Earth is one of the sun's children? The sun has a family of

The Ring Master and His Circus big and little planets. Each one travels on a different circle, at a different speed.

### OUR NEIGHBORS IN THE SKY

Besides, this dull red planet is nearest us of all the sun's children. Through a telescope we can see continents an di oceans, lines that are thought to bel canals of water, white ice-caps at the poles, moons and vapor clouds. People may be living on Mars!

Ip, like the headight of an engine.

It has

Why lubiter eight
is Like a moons,
four of
which can be seen
hrough a very
mall telescope.
Saturn has three

Jupiter and the Four Largest of His Moons

ust a big globe
of glowing gas,
with rings of stardust.

right, moon-like

It is

to

ings.

hought

Uncle Jupiter and His Five Moons

The reason why we can find the Jupiter, next beyond Mars, is a planets among the thousands of big, young, hot world. It may be all stars in the sky is because they are

If Saturn Should Fall Into the Sea

Saturn is merely a mass of hot gas and if he should fall into a sea big enough to hold him, he would float like a big cork.

fluid, melted rocks and water, as our earth was when it was young. It is as busy making steamy vapors as a teakettle. Except when Venus is in the sky, Jupiter is the biggest, brightest planet. It crosses the southern sky, high

wanderers; bright visitors coming and going among the other stars. All the others that we can see are in groups, or clusters, that do not change places with each other. As the earth journeys

# Long, Long Journeys

If you happened to be living in Jupiter and going to school where you do now—well, you just couldn't! Why, even if you traveled as fast as sound you would never be on time. Although sound travels 360 yards in a second, Uncle Jupiter is so far away that it would be 60% years after the school bell rang before you heard it. Saturn is twice as far, Uranus four times as far, while Neptune is eight times as far away as Jupiter. Although electricity can go around the world ten times in one second, it would take three hours for a telegram to reach Neptune; light, traveling 186,000 miles a second, two and one-half hours to reach Uranus while the nesrest star is so much farther away than that, that it would take a ray of light four and a half years to reach it; it would take a cannon ball 90% years to reach Saturn; an air-

ship 90 years to reach Mercury, although it's only \$7,000,000 miles away! A motorcycle at 40 miles an hour would get to Mars in 85 years. It would take a horse, trotting 11% feet a second, 375 years to reach Venus, while a train at 60 miles an hour would require 177 years to make the 93,000,000-mile trip to the sun. The moon is so close—only 238,850 miles from the earth—that you could walk it in seven years. Here you see the planets as they appear through a telescope; Venus with a few bary marks, Mars with others that scientists think may be causes. You readily recognize Saturn by his rings.

Venus is the brightest star we have and is always seen near the horizon just after sunset. Mercury tooks like a rather bright star, but is always twink-ling violently—like the eyes of a laughing boy. None

# to Distant Worlds

1

planets that are tarther away, though, snow the phases very faintly—some not at all. Jupiter, although the Earth's Biggest Brother, whirls much faster than the earth. It only takes about ten hours for Jupiter to whirl around once, while Venus, the Earth's

Little Sister, whirls very slowly, requiring 225 days. Mercury and Venus both rotate so slowly that part of their surfaces never receive the sun's light. Three-eighths of Mercury is always in darkness. Three-eighths of it has perpetual sunshine, while one-fourth is alternately in sunshine and shadow.

around the sun, it finds these stargroups in the same places every

How the Little Bear Trots Around the Pole Star

Here we see how the Little Bear swings around the Pole Star as the positions of the constellations change in the heavens.

year, as if they were painted, or studded like jewels on the sky.

# An Easy Group to Find

The easiest star-group, or constellation, for you to find is the Big Bear, or Dipper. It is always in the north. The two stars on Pind the Big the outer edge of the cup Bear and point to the polar star. Hio Family That forms the end of the handle of the little dipper. Opposite the big dipper is Cassiopeia's chair of six stars. These three stargroups appear to circle around the polar star every night, and every year.

All the stars appear to move from east to west, just as the sun does.

But it is really the earth

Stars Soem that turns from west to to Move to east, leaving sun and stars behind. Outside of these three groups near the polar star, is a larger circle of constellations. A still larger one crosses the sky, a little south of overhead, in the

path of the sun. It is there you should look for the planets.

# Strange Fancies of the Ancients

There are eighty-nine of these star-groups. Centuries ago people fancied that certain constellations

"Soring mals. Some of them mals. Some of them were named for the bear, the dog, lion, bull.

dragon, scorpion. Other clusters were called the twins, the crown, the lyre. And some were named for great heroes and heroines, like Hercules, Perseus, Orion, Cassiopeia and Andromeda. Then the moon was called the car of Diana, queen of the night and huntress of the skies. The sun was the fiery chariot of Apollo. The planets were named for the gods of the Greeks.

Some star-groups are easier to find than others, because of the bright stars in them. Sirius, the dog

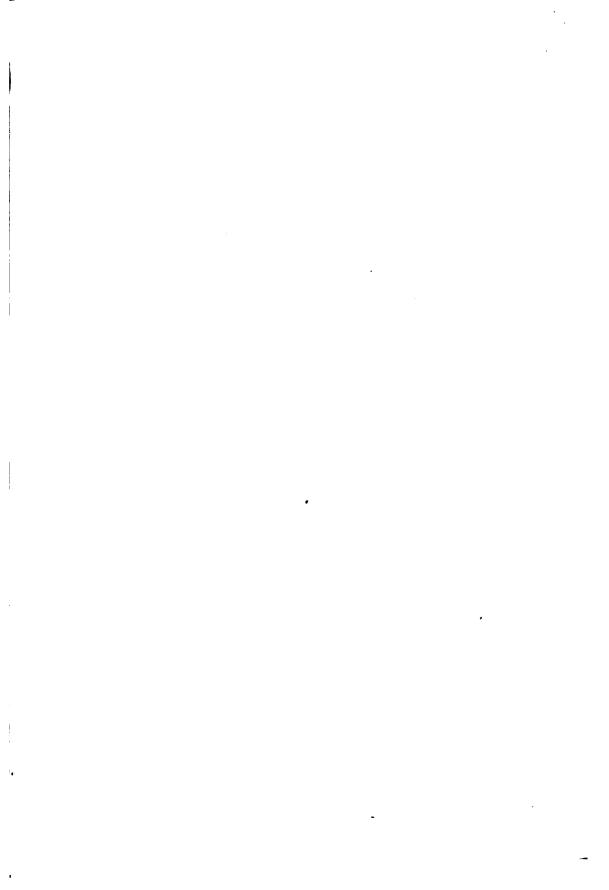
A "Dog" star, in the big dog
Bigger group, is the largest star
Than Our in the sky. It is a blazing white sun, many
times larger than our sun, but much
farther away. You can see it, low
in the south, in mid-winter, or above

the rising sun in August. Vega is a beautiful blue-white sun in the small lyre group. In July it is nearly overhead. Arcturus is a big yellow sun, in the south in summer.

### Where the Comet Gets Its Tail

When the papers report that a comet is coming you should watch for it. A comet is a starry wanderer with a shining tail. The tail is made of vapors, or of dust blown out of the comet by the force of the sun's rays. The tail always points from the sun, switch-

ing around to the other side when





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are broken up and scattered by the turing shooting stars, or meteoric pushing power of light rays.

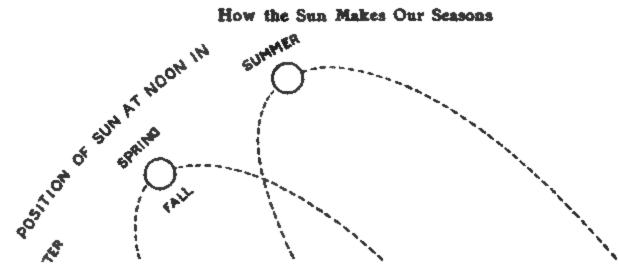
# Do Starry Worlds Capture Each Other?

At one time it was thought that our sun and all its planets were one whirling mass of fire, vapor and star-dust; that the cen-How New tral fire shrank in on it-Worlde are Made self, and the outer rings broke up into planets. Another

### Wonderful Glasses Astronomers Wear

Like weather men astronomers have many instruments. Their tools are all explorers of space. scopes can find stars that Seeing Thirty are thirty thousand mil-Million Miles lion miles away! Stars are caught with telescopes, reflected

How the Sun Makes Our Seasons



**SUNRISE** 

SUMMER SUNRISE

Here is shown the position of the sun at noon in winter, spring and summer. On the hill to the right is an astronomical observatory.

explanation offered was that the sun hurled big and little pieces of itself out, to form planets, and the planets made their moons by volcanic explosions. But now it is thought that the sun, with its pulling power, captured the planets that were wandering in space. Then the planets captured the moons, moon may be a dead planet, as it looks to be. The earth is still cap-

and the reflections mirrors, in photographed. Light rays are split up into colors, and made to tell what minerals are in a star; whether a star is a solid, a vapor, a gas or a mass of star-dust.

What do you think is the most interesting thing in the sky to an astronomer? It is a patch of cloudy light that you might not notice at all. These patches are called nebu-

iæ. "Nebulous" means misty. Most of them are spirals of glowing gas, vapor or dust, whirling around a starry center. It is now thought that all suns and planets began as nebulæ. By studying them it is hoped to find the secret of the skies—how worlds and suns are all the time being made and unmade.

# The Old Myth Stories of the Stars

Before the days of books the sky was a great story and picture book. The sun, moon, star-groups, planets and brightest sun-stars, were heroes of many a tale, or the dwelling places of the gods. These myths grew out of religious beliefs, so they were beautiful and poetic.

In the artist's Story of the Constellations he tells you some

Myth h Stories the

of the most f

Stars Toll ne other interest You c Iuno has ser annoy Hercul his toes. June the other go goddesses, had agreeable tion. She was always doing ugly things to annoy people she didn't like. In his right hand Hercules holds his big club and in his left a branch

around

which serpents are twining. Over his shoulders is the skin of the Nemean Lion, the killing of which was one of his famous Labors. Bo-o-tes, the Hunter and Herdsman, is pursuing the Great Bear with his dogs. The dog with his feet in the air is Sirius the Dog Star, and the star near the end of his nose is one of the most brilliant in the heavens. Not many people know that the Great Bear and the Great Dipper The Great Bear was are one. once a beautiful woman. Callisto. Juno, jealous of her beauty, changed her son into a Little Bear and put them both in the sky. that hateful Juno fixed it so they could never approach one other and so they wander

> pole always in lways the same om one another. ellations shown ige — are as appear at 10 ., August 23; M., September 8; 8 P. M., September Lying 23. on your back holding the picture before you in such a way that north points north, study one constellation at a time and then go out and locate it in the

> > sky.

By means of the electric switch box which you see in the chair, the astronomer controls the motions of the telescope so as to keep it fixed on the objects he is looking at.

#### The Wind and the Moon

Said the Wind to the Moon, "I will blow you out;
You stare in the air
Like a ghost in a chair,
Always looking what I am about—
I hate to be watched; I'll blow you out."

The Wind blew hard, and out went the Moon.
So, deep on a heap
Of clouds to sleep,
Down lay the Wind, and slumbered soon,
Muttering low, "I've done for that Moon."

He turned in his bed; she was there again!
On high in the sky,
With her one ghost eye,
The Moon shone white and alive and plain.
Said the Wind, "I will blow you out again."

The Wind blew hard, and the Moon grew dim.
"With my sledge and my wedge,
I have knocked off her edge!
If only I blow right fierce and grim,
The creature will soon be dimmer than dim."

He blew and he blew, and she thinned to a thread.
"One puff more's enough
To blow her to snuff!

One good puff more where the last was bred, And glimmer, glimmer, glum will go the thread."

He blew a great blast, and the thread was gone.
In the air, nowhere
Was a moonbeam bare;
Far off and harmless the shy stars shone—
Sure and certain the Moon was gone!

The Wind he took to his revels once more;
On down, in town,
Like a merry-made clown,
He leaped and halloed with whistle and roar—
"What's that?" The glimmering thread once more!

Slowly she grew—till she filled the night,
And shone on her throne
In the sky alone,
A matchless, wonderful silvery light,
Radiant and lovely, the queen of the night.

Said the Wind: "What a marvel of power am I!
With my breath, good faith!
I blow her to death—
First blew her away right out of the sky—
Then blew her in; what strength have I!"

But the Moon she knew nothing about the affair; For high in the sky, With her one white eye, Motionless, miles above the air, She had never heard the great Wind blare.

-George Macdonald.



# The Mysterious Lights of the Frozen North

URORA means light. old Greek myths Aurora was the rosy goddess of morning. Boreal means "of the north"-"Aurora Ausnorthern lights. tralias" is astronomy language for "southern lights." Both are often called polar lights. this is not correct. The wonderful plays of light are not seen near the poles but along latitudes 70 to 60. About once every eleven years they are seen as low as 40. The long, dreary nights of Arctic winter are often relieved by quivering sheets, moving pil-

streamers, and rayed arches of brilliant sunset colors that mantle the sky and illuminate the snowy landscape for hours at When the a time. They are Compass most often seen before or after violent storms, when there is an electric disturbance. The magnetic needle in the compass, too, is unsteady during the display. Benjamin Franklin thought the northern lights were caused by discharges of electric-Spectrum analysis indicates that auroras may be glowing

curtains

fluttering

lars,

THE SECTION AND THE PARTY OF TH

gases. They are seen more frequentiy when large spots appear on the sun, which, it is now thought, are caused by electric cyclones. Astronomers are much interested in auroras for they seem to be mixed up with the weather of the earth and the sun.

How would you like to live in the land of the Eskimo, where you could see such grand "fireworks"? The Eskimo takes the same delight in them as if he v

always a child.

In the picture at the head of this article he is sailing by the light of the aurora in his kayak and he has his eye on that walrus just ahead of him. The Eskimo in his kayak is a match for any walrus. And how he can manage kayak! that makes no differenc to him if he turns up-The Serpent Aurora Sometimes the Aurora side down or if his head takes the form of gets into the water. He a fiery serpent. immediately rights himself. The kayak is waterproof, and some Eskimos become so expert in the use of it that they can turn complete somersaults in the water—as easily as a

"bird man" can turn over in his flying machine. Getting into a kayak is
much the same as mounting a broncho. He brings it up alongside of a
stone or cake of ice and steps gingerly in. If there is nothing on which to
mount, he crawls along the kayak
until he comes to his seat. Getting
out of a kayak is worse than trying
to undress in the upper berth of a
sleeper, going at the rate of sixty

an hour. Those icegs you see are about seven-eighths of their mass in the water. They have been known to measure two and one-half miles in length and as much in width. Such a mass of ice weighs about two thousand million tons, or enough to three hundred thirty nids of Egypt.

s is how icebergs are norn: The snow falls and freezes until in many places it is ten thousand feet deep.

This snow is very heavy and is naturally squeezed out at the edges. Advancing into the water it is raised by its own buoyancy and soon breaks off in these monstrous masses.

In the North behold a flushing; then a deep and crimson blushing;
Followed by an airy rushing of the purple waves that rise!
As when armed host advances, see, a silver banner dances,
And a thousand golden lances shimmer in the Boreal skies!
The vision slowly dies!

-- JOSEPH KEARNEY FORAN

# IN THE GREAT WORLD OF NATURE

THE WINDS AND THE WEATHER

#### A Visit to

# The Man With a Hundred Eyes

HE artist has told so much of the weather story in his interesting picture that we were really afraid we wouldn't get to talk to you at all, because there wouldn't be anything left for us to say!

#### Myth Stories of the Weather

You see he begins with the most ancient thing about the weather —the weather myths. Weather is such a tre-men-dous thing that men have always been interested in it and wondered about it and tried to account for it.

The Chinese, as you see by the quaint old rain gauge with the Chinese characters on it, measured rainfall very much as we do with our rain gauge of today. (The Chinese weatherman's gauge looks like a tea chest, doesn't it?)

On the left in the sky is Thor, god of thunder. According to Norse mythology he was the "It"

that rained and the What a thunder was the noise Noise his chariot made in Thor Made! rolling through the

clouds-like the noise of a lumber wagon going over a wooden bridge. On the right is the sun god as the Greeks and, after them, the Romans, thought of him. They could see what great things the sun does in bringing back the seasons and making things grow, but they didn't even suspect that he, with the aid of the winds, which he also helps to keep going, is one of the most N X X X

important parts of the "It" that makes it rain.

#### Waltz of the Winds

But now let's see if we can't discover the real truth about the weather and the winds it rides on

from what there is in Like

the picture. Which Happy Children way is the little wind Dancing sprite blowing that you see just in advance of Thor? Now, which way is the wind blowing that is driving the ship toward the cliff? In just the opposite direction. And yet this is all one and the same wind. "How can the same wind be blowing in two opposite directions at the same time?" you ask, puzzled. And no wonder, for it puzzled the scientific men for a long time; until our wise Benjamin Franklin suspected the truth, which is that the winds move just like two happy little people waltzing across a room-turning round and round and moving forward at the same time. So Franklin had friends in different parts of the country note the direction of the wind at a given hour on a given day. Then he put all these directions down on a diagram very much as you see in those queer little marks that look like darting water bugs on the weatherman's map. And, sure enough, when he came to connect all these directions it made a circle—although not a perfect circle. Later in this

story we will tell you how these immense wind wheels are formed.

Notice on the horizon back of the sea the sand columns in the desert. These are formed by whirling winds.

The Winds and the dust columns that go whirling over the dry country roads in summer

time. Notice how the camels are hurrying away, for this is one of the terrible desert storms called simoons. And there sits the sphinx, gazing with his mysterious eyes across the desert. On another page you can come closer to Mr. Sphinx and see where these same desert winds have carried away his nose by flinging sand against it for centuries and centuries.

#### The Weather Man and the Frogs

Tell you about the old man and his dunce cap! The dunce cap is really the cap worn by ancient wise men called astrologers, That who used to undertake to foretell the weather by reading the stars. When they put such caps on the heads of boys who didn't get their lessons it was meant to be sarcastic. Here the playful fancy of the artist has shown one of these ancient weathermen explaining to a group of frogs the meaning of the weather map. Of course frogs are interested in the weather. The rain-frogs often talk about it. The Weather Man is illustrating what he says with a weather map showing the great Galveston cyclone. He points with one hand to the region in which the hurricane began and with the other hand, to the record of the barometer, that wonderful device by which the storm guest writes his name on

the register hours and hours before he arrives.

No wonder the frog with the glasses looks alarmed! I'll warrant you that he didn't know before that the weather that keeps the pond filled up and brings down the fresh, sweet rain drops that he loves so well could do such a ter-ri-ble thing as make cyclones and hurricanes.

Notice the globe on which another frog is sitting and how the arrows are whirling around the pole.

These arrows are saying More Things that the winds have a the Frogs are Telling regular path around the pole where they keep going round and round like the horses in a circus. The frog who is carrying the rule is telling us that the Weather Man, in making his predictions, takes into consideration the height of clouds. The frog at the telephone tells us that the Weather Man gets weather news from all over the country and puts it together to find out what is going to happen next. That is why we call him "the man with the hundred eyes." He sees with the eyes of other weather men scattered all over the country who report to Washington and other weather predicting centers.

#### Other Things the Picture Tells

The picture also shows the kind of barometer in which a little man comes out with an umbrella if it is going to rain and a lady comes out with a parasol if it is going to be fair weather. Near by is a duck watching the instrument which tells how fast the moisture is evaporating. Notice the scale with which this evaporation is measured—just as a grocer measures sugar.

On the house is a weather vane such as you see on people's barns. It shows the direction of the wind I COUNT THE RAINDROPS

and below it the instrument which shows how fast the wind is blowing. It looks like a whirligig turned wrong-side up, doesn't it! The cups on the end of it are to catch the wind. And now that I have pointed out so many things in this "moving picture," see if you can find for yourself where Father Robin is making an umbrella of his wings

to shelter Mama Robin and babies. Papa Robins do do this very thing!

# How Did the Weather Man Know?

"It's going to rain." So said the Weather Man in weather language.

How did the weather man know !

Friday was a beautiful Autumn

day, with soft, during a given time. That little bent tube prevents the water from evaporating before it is measured. When the last drops have run out of the funel there is still some water left in the tube because water cannot rise higher than its source. This water acts like a cork so that the moisture evaporating from the water in the gauge like rain a gentle-cannot get out. But the weather cannot get out. man said, in the morning papersand this is just how he said it:

"Unsettled weather Saturday and Sunday, with showers; colder by Saturday night; moderate to brisk south winds, shifting to northwest by Sunday night."

Now, how did the weather man know all that before it happened? Up in his weather station tower could he see cold and rain coming, on the wings of the wind?

### The Man With a Hundred Eyes

Yes; but he had the eyes of more than a hundred other men in weather stations scattered over our big country to help him. And he had tools.

You never heard of weather tools? Oh, yes, you have. You have a thermom'-e-ter in your school room. The

Tools for Taking the Weather Apart

mercury in the tube is a messenger boy. It climbs with the heat and falls back with the cold. It

tells you the temperature of the air plainly as a clock tells the

time of day. And you must have seen metal arrows turning on pivots above house ga-They are bles. weather vanes. They point whichever way the wind is blowing. A pinwheel of paper, whirling on a stick, will show you how fast the wind is blowing. In the curious toy man appears with

an umbrella, the figures are moved by fiddle strings that stretch in damp, and shrink in dry air.

Some of the weather man's instruments are very simple. school could put up a weather vane.

Children could make a Studying the Weather rain gauge of a jar with at School a funnel lid, and measure a heavy rainfall with a ruler. They could e-vap'-o-rate water from a five-cent glass test tube, and find out how much vapor the air was taking But other weather instruments are as full of delicate wheels and

springs and things as a watch. Would you like to peep into the weather man's workshop?

# In the Weather Man's Workshop

Many of his instruments look like clocks, grocer's scales and gas meters.

Most of their names end in "meter,"

thin metal box in the case is partly emptied of air. When the air out"A Little side is heavier than the air inside it pushes the Saya the Hair sides of the box in. That sets a wheel in motion and turns a hand on the dial.

In another kind of meter a human

# How the Storm Writes its Name

This is a recording barometer, the ingenious instrument that foretells the weather by making the weather guest register many hours before he arrives. A gradual but steady rise indicates settled fair weather. A gradual but steady fall indicates unsettled or wet weather. A very slow rise from a low point is usually associated with high winds and dry weather. A rapid rise indicates clear weather with high winds. A very slow fall from a high point is usually connected with wet and unpleasant weather without much wind. A sudden fall indicates a sudden shower or high wind, or both.

which means "measure." A gas meter measures the gas you burn. A moving hand marks the amount on a dial. The thermom-What a eter, or thermo-meter, is Lot of Meteral a heat measurer. anemometer is a wind measurer; the hygrometer a water-in-the-air measurer; the barometer an air-pressure measurer. Electricity, the force of the wind and the height of the clouds are all cal'-cu-lated by the weather man.

One of the best barometers is shaped like a flat, round clock. A

hair is made to tell a great deal about dampness. Naturally curly hair curls tighter on a moist day, but straight hair becomes straighter. stretches in wet weather, Hair shrinks in dry, so a long hair, set in a frame, moves a delicately balanced hand over the dial of the The wind measurer hygrometer. is a whirligig. On the ends of four short arms are hollow cups that catch the wind, and set this "anemometer" to spinning. A dial shows how many times the cup whirls around the circle in

# THE WINDS AND THE WEATHER

ute. It is easy then to figure out how many miles an hour the wind is traveling.

Reading the "Mind" of the Clouds

A weather man looks up to the sky to see if there are any clouds, what kind of clouds they are and

rus cloud. It often travels south or east when the wind on the earth is going west or north. It is so high, as high as mountain tops, that it is in a different current of air. The cirrus cloud is thought

Not Waves of the Ocean, but Clouds of the Sky

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marks where rain was falling. In the shaded places on the map a fraction of an inch of rain, or more, had fallen in twelve hours.

Of course you have guessed that the little arrows are weather vanes. showing which way the wind was blowing. The dotted lines that wriggle across the map show the temperature. Everv place

**Drifting Clouds** 

coming down. It rushes down into a "Low" just as naturally as water runs down a hill; because it cannot help it. It is in a hurry. So a "Low" for

all it is so quiet, is a storm cen-Blustter. ering winds blow into it, catch the vapor and turn it into rain or snow. Weather changes come on the wind. But the wind doesn't really go "whither so-ever it

Watch a sky partly veiled with clouds as this one is. You will see the clouds driven of ward by currents of air. some traveling rapidly, others drifting laxily along, but all of them constantly changing, assuming new shapes and forms.

the same line had the same degree of heat or cold. The squirmy solid lines show the weight of the air, or air-pressure. There are several oval spaces inside air-pressure lines, marked "Low" and "High." Those are very important. They are the first thing a weather man looks at.

### What a "Low" Is and What a "High" Is

A "Low" is an out door room full of warm, light air-that is, warm for the season. Warm air, you know, goes out of a room at the top of the window. Cold Why Warm air comes in at the bot-Mir is tom, or through that "Polite" crack under the door. It goes out Warm air is polite. quietly. But cold air has bad manners. It pushes and elbows its way in like a bully on a playground. A "High" is full of cold air that is

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listeth," that is to say where it likes. The winds are "just naturally obleeged to go" certain ways—as the colored gentleman said.

# Where and How the "Weather Crops" Grow

If you were to divide our country into weather zones you would probably make three broad belts running east and west. The north-

ern edge would be cold,

Weather the southern warm, the Zones and middle "betwixt and be-Other Zones tween." But that way of dividing would not do at all for a weather prophet's work. Oceans and mountains, and the way the wind blows, have most to do with We shall have to study weather. country to understand "weather crops."

The United States is three thousand miles wide, with an ocean on The Mystery of the

Little Wooden Horse

What would you think of a toy horse that would take a walk—all by itself—just because the weather was bad?
It's a fact; there is a toy that does

It's a fact; there is a toy that does that!
You shut it up in a room and lock the door and give the key—say, to your little cousin that is visiting you—and tell him to keep it until after the rain comes, and see if the horse has not taken a little walk.

Have him look the horse over carefully—take him apart if he wants to —and see that there is no machinery in him. Then, when he opens the door and finds the little horse has moved "quite a way," just as you said he would, show him (but let him guess a little first because it is good for boys and girls to guess about things worth while) that part of the horse is made of a pe-cu-li-ar kind of wood that expands in wet weather—grows longer; this makes the little horse push out his hind feet and so drive himself forward just as if he were galloping.

the east and on the west. The sea coasts, mountain ranges and valleys all run north and south. But most of the winds come from the west.

The winds that blow The Coast from the Pacific Ocean Rain are stopped, two hun-Belt dred miles inland, by the

Sierra Nevada and Cascade Moun-That makes a warm, rainy belt along the coast. This we might call "Weather Zone No. 1."

From the coast mountains to the

Rockies is a high plateau, eight hundred miles wide. that never gets enough rain. It is cool and dry in the north, hot and dry in the south. The third belt is the eastern slope of the Rockies. Cold north, and hot south winds, with little moisture, blow there. Now watch these winds turn east! In the prairie belt, along the Mississippi, the

winds are from the northwest and southwest. They pick up water from the Gulf and the Great Lakes, turn eastward and blow across the low Alleghenies, out into the Atlantic Ocean.

#### Why the Wind is so "Fickle"

"But," you may say, "where I live the wind blows every which way, sometimes all four ways in a day." You know the Of course it does. earth has two motions. It turns toward the sun, making day and night; and it travels around the sun, making the seasons. Wind travels

forward, in a straight or curved line, and, as it travels, it whirls. The winds waltz across the country, as dancers waltz across the room. You must have seen little whirlwinds

Gigantic Walts of the Winds waltzing along a dusty The wind that road. you feel, at any time, is only a small part of a

wheel of wind that is moving for-Cycle and circle mean the same thing. So cyclones are just circular winds. They may be a hun-

dred vards or hundreds of miles is a hurricane.

How the "High" and the 'Low' Brought the Rain

wide. Cyclones are not dangerous unless they are traveling forward very fast, or spinning like a top. A wide cyclone, rushing like a railroad train. small cyclone, whirling so rapidly that it pulls up trees and houses, is a tornado.

that weather in Chicago that we spoke of at the beginning of these With an east wind weather talks. on Friday, bringing vapors from Lake Michigan, and a warm, hazy air, Chicago had a "Low." arrows showed that colder air was flowing in from a "High" to the northwest. Another side On the of the big wheel of wind "Other " Side of the would pass over Chicago Wheel Saturday, giving a south wind. You see the weather man knew how fast the whole wheel was traveling southeastward.

Let's see if we can understand

# A Rain Map of the World



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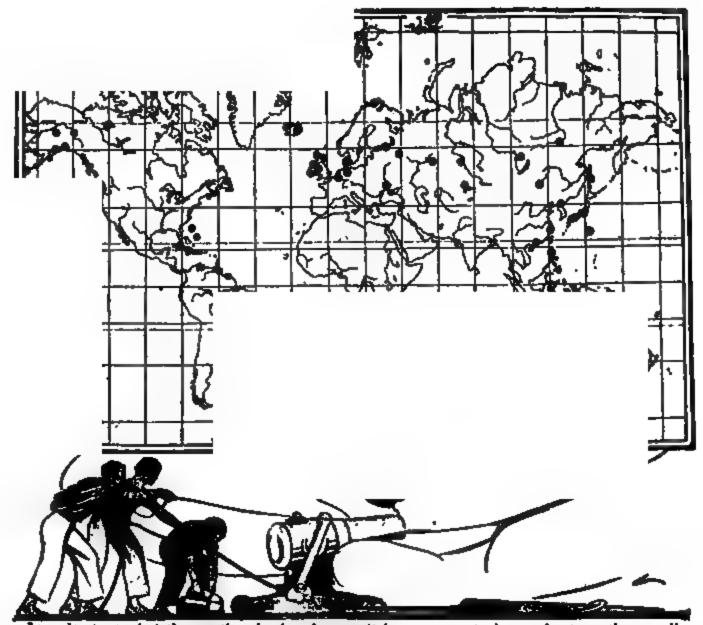
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The parts with the heavy, wiggly lines, marked (1) have the average, good rainfall that is necessary for crop raising—from 20 to 75 inches a year. What zones are they in and how far are they from the sea? Number (2), the heavy, straight-lined parts of the world, have lighter rainfall, from 10 to 20 inches. If you know where the high mountains of the world are and from which direction the winds blow, it will be easy to explain the rainfall in these regions. In the parts of our own country covered by these lines, irrigation produces fine crops. The dotted areas are the desert lands with the least rain of all—less than 10 inches. The location of mountain ranges will explain them, too. And the black parts, number (4), are all near the equator, you see, where the rainfall is very heavy, over 75 inches a year.

The Earth's Rain Belt

You have often seen pictures of Saturn with his rings. But did you know that if you could get far enough away from the earth to look back on it, as we do on Saturn through a telescope, you would see a belt of clouds around it? The water of the equator, under the hot sun, is constantly sending up vapor which turns to clouds in the cooler atmosphere of the upper regions and then comes down in rain. You never saw such a rainy place as it is around the equator.

# The War And The Weather Man



In order to predict the weather far in advance, it is necessary to know about weather conditions not only in the United States but in Europe; for we "import" weather from Europe just as we do other things. When the great European War of 1914 broke out, the United States Weather Bureau was receiving reports from all the places shown on this map and could forstell the weather a week in advance. When the war came, these Old World weather reports were cut off and the week-ahead predictions suspended.

Sunday night the farthest side of the cyclone, with cold northwest wind would pass over Chicago and turn the vapors to rain. Monday very likely would be colder and clearer.

The very worst of our storms are made by a "Low" in the Lake region, with a "High" in the northwest near the Rocky Mountains. A whirling torrent of cold air rushes down into the "Low," bringing wind, making rain and snow of the vapor in the air, and leaving cold behind it. Picking up

more water from the Lakes it sweeps far down the Mississippi and across the low mountains to the Atlantic ocean.

### The Storm Center in the Indies

There is another storm center in the West India Islands, southeast of Florida. Hurricanes that start

Where Our lantic coast, sometimes to New England, and curve out to sea. Or

they turn westward and sweep the Gulf coast. Such a storm destroyed Galveston, Texas. But these West Indian storms never cross the Allegheny Mountains, nor come very far up the Mississippi valley. That big west wind, that crosses the lakes and spreads south and east, pushes the other wind away.

"Get off the track!" it says. "I'm the through train and have the right of way."

The Indians called the west wind "Mudjekeewis, king of all the winds of heaven."

#### The Old Joke About Medicine Hat

There used to be a joke about a

place in Canada called Medicine Hat. People said it was not a town but a "weather factorv." Now. we know that Medicine Hat gets its weather from the west, too. So does the Pacific coast. The wind blows eastward across the Pacific, and east-

ward across China and Siberia. The Russians used to think their weather factory was in Norway. English people thought their weather was made in the Atlantic Ocean. Now they are sure it comes from Labrador. New York blames Chicago for its blizzards. The Chicago weather man keeps his eye on the northwest.

Do you see? There is a wide cyclone path around the earth, between latitudes forty and sixty, north; just where most white people live and travel and trade. All the

storms over that wide path blow from west to east. Where these winds blow over bodies of water Warm and they are warmed, over Rainy, land they are cooled. Cold and Dry So, the northwestern coasts of both the old world and the new are warm and rainy, the northeastern coasts, cold and dry.

#### The Watch for Cold Waves

All the way around the northern world, weather men keep their eyes chiefly on the west and watch the "Lows" and "Highs." If there is

SYMPHONIES

a "Low" at Chicago and a "High" one thousand miles to the northwest, and the wind is traveling forty miles an hour, the weather man will say a storm is coming and should be here in about twenty-four hours, followed by a cold wave. But, if there

Henry Ward Beecher.

"The seventy-third psalm reminds me of some of Beethoven's Symphonies; and these, again, always make me think of the tumult of the forest, when the wind roars and swells and surges with wild discord among the trees; when the branches creak and crash against each other, and every bough has a separate wail. By and by the wind lulls; and when twilight is beneath, and all the forest is quiet, or only so much noiseful as the insects make it, then some bird on a treetop sings out clear and sweet, and his song goes floating away over the wood, the very soul of peaceful joy."

BEETHOVEN'S STORM

is another "Low" in upper Michigan, that storm may turn east over Lake Superior.

In that case Chicago might get the southern edge of the cyclone, and have local showers. On the high plains Rocky east of the Rocky Moun-Mountain tains rain is most apt to fall when north and south winds run into each other. But in nearly every other part of the country it is the meeting of the east and west winds that most often brings the rain pouring down.

# Four Kinds of Climate in the United States

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Our country can be roughly divided into four areas, each of which has the same general conditions of climate. The area indicated by (1) is composed of the states farthest south. You know what the weather is there—the summers are hot and the winters temperate. North of it is the white space on the map, region number (2). In it we find the two extremes of temperature, will winters and hot summers. Number (3) has moderate summers and cold winters, and number (4), the Pacific coastal region, is always temperate. Its summers are not very hot nor its winters very cold. A present that the sea brings us from Japan is responsible for the moderate weather near the Pacific. Do you know what it is?

"What good does it do to know what kind of weather is coming?" you ask. "No one can stop it, or do anything about it." Well, let's see. Storms on the lakes and seas are dangerous for ships. When the weather man puts out a black or a red centered flag, giving warning of

What the Weather wind and snow," capProphet tains keep their vessels in port. When a farmer sees a blue flag, or a blue and white one, on the weather bulletin in the postoffice, he knows he must hurry home and get in the hay, before the

coming "rain," or "local showers" can spoil it.

When frost is pre-dict'-ed orange growers watch thermometers in their orchards, and keep oil stoves burning under the trees to raise the temperature. Shippers hold back eggs and fruit in zero weather. When warned of a blizzard, railroads get out their snow plows to keep the tracks clear. The price of wheat and cotton go up and down, on good and bad weather reports. Public health officers watch weather, and warn people when there are likely to be more cases of scarlet

#### THE WINDS AND THE WEATHER

fever, diphtheria, pneumonia and grippe. Every paper prints what the weather man says, and sensible people obey his orders.

When the weather man says it is going to rain or snow, children

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And they should ask him if they can go nutting in the woods, or have a picnic tomorrow. Sometimes a storm runs off on a branch line, or backs up on a switch and fools the weather man. But he is right, eighty-

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# When the Winter is Over

And when the winter is over,

The boughs will get new leaves,

The quail come back to the clover,

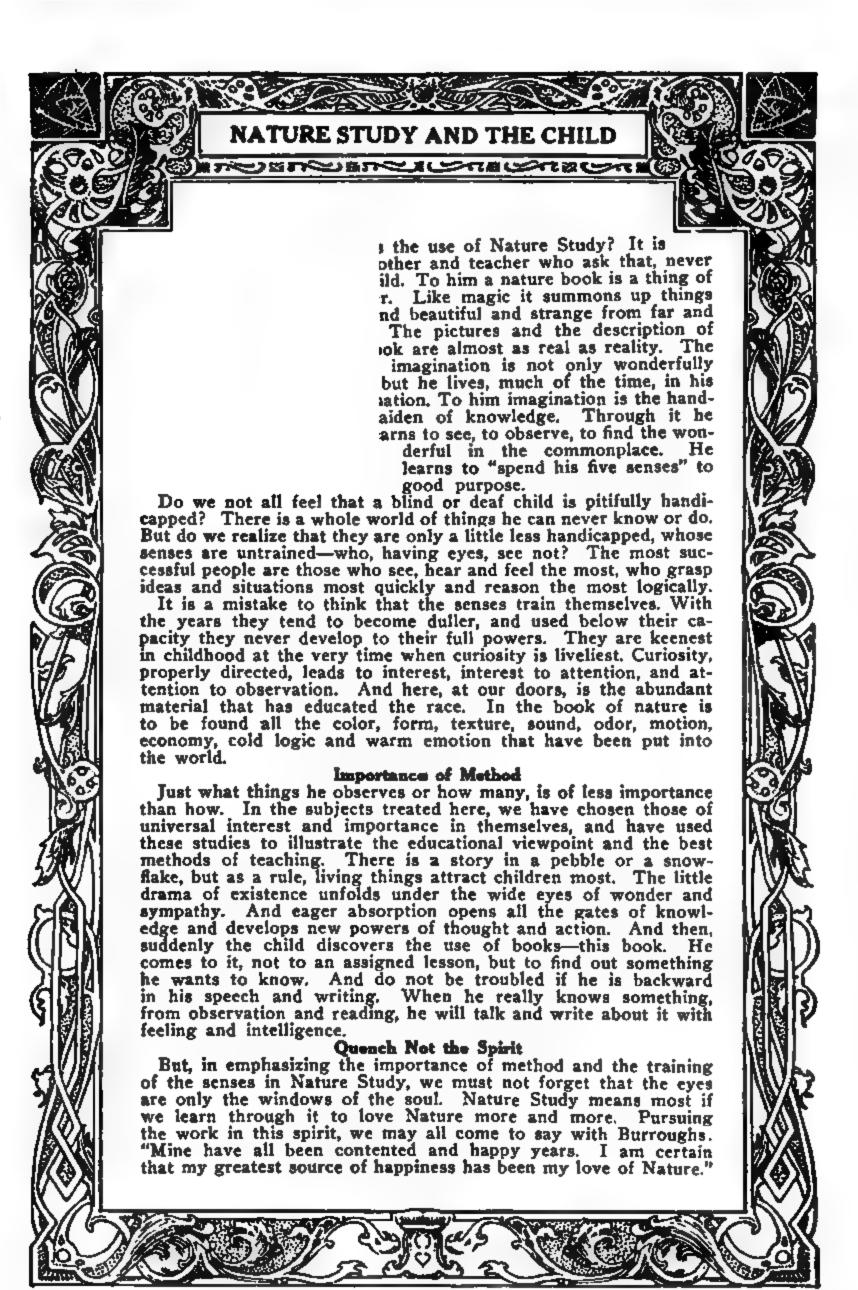
And the swallow back to the eaves.

The robin will wear on his bosom
A vest that is bright and new,
And the loveliest wayside blossom
Will shine with the sun and dew.

There must be rough, cold weather, And winds and rains so wild; Not all good things together Come to us here, my child.

So, when some dear joy loses
Its beauteous summer glow,
Think how the roots of the roses
Are kept alive in the snow.

ALICE CARY





I have speed 77 years in the 200 of they have all bise conducted & traff years, I am entire that my grant some of leoppiness tear bean my of nature - my love of the far of the tirde, the accounty, the flow 4 all open air things. Techne we always have with us, You Ca begin to be a makematist right w you are, in any place + in any seawn. Low is the great extremt life. Obstacles & disconsquents affect before it - It sharpens the age of guidlen the food or make skiefue the land, Whitman say The press of my foot to the exects Springs a tement offection," an Whiten we not a notice there either, but a right lover, Each you may have a hundred run of turn if you take you west with you & Kiesh you eyes & con open when you would in drive with Com Mary Friend " in Burroughes

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re seeds crowded on the cob. f all the grasses it is easiest to y corn, because every part of it There, the whole cob o large. of seeds is wrapped in husks. in wheat, and most other grasses, , tiny seed is wrapped up by itin straw scales. When the ns are threshed these scales fly y as "chaff." Some seed scales e bristles, that make stiff beards, he crowded seed spikes. Barley, and some wheats are bearded. ll the grasses bear a one-leafed . The baby plant grows from one Peas and beans split into two Corn and wheat do not. it these seeds in sand boxes and how differently they grow. eat looks as though it might split rowing, because of the groove in Many grass seeds have side. tiny furrow.

he cereal grains are little lunch es, filled with food for the baby it. First there is a horny skin wheat as thin and as tight as your . Then there is a layer of brown en cells. The middle is a plump cet full of white starch.

#### rly a Thousand Things To Look For

nd grass is all alike? Why there nearly one thousand varieties in country alone! Along every iside you can find dozens of n. All the grains but wheat w wild. You can find the large, oping seed sprays of wild oats, bristling beards of wild rye and ey. Some of the wild grasses is so much like the field grains: farmers call them "cheats." Vild rice is often called the reed as It grows in the shallow wa-

#### Cultivated Wheat

Wheat is supposed to have first come from Asia. If you knew the history of wheat, you would know almost the history of civilization, for it has been used as food since the beginning of history. Some kinds of wheat have white grains and some are red, but it gets its name from an old Anglo-Saron word, "hwaete," which means white.

An other curious thing about wheat is that some varieties wear a "beard," while ■ PICTURED KNOWLEDGE

■ teac be

fan considerably the worse for wear, doesn't it? These palm-like igascar. The lower parts of the huge leaf stalks are hollow, so that ater. If the leaf stalk is cut across, a stream of water gushes out se how it got its name.

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A wiry stem supports three, broad leaves in a flat whorl. From where A "Violet" they are joined a flower That Im't a rises. Both the white white and the painted trilliums flare open and flutter three pointed petals. The stemless wake-robin is closed into a stiff purple-red cone.

Later in the season you should look for Jack-in-the-pulpit. flower is a club spike standing in a bell, like the calla lily. Jack-in-the-This sheath is a leaf of Pulpit and His Priends green and purple, the tip arching gracefully over the little preacher. Another lily, most beautiful for its foliage, is Solomon's Seal or twin flower. It is a swaving fern-like leaf of many leaflets. Strung along the stem are pairs of small closed bells of greenish white. As many as ten pairs of twins sometimes droop from one twelveinch leaf.

spurred at the base, and flaring at the mouth, make a neat cylinder blossom an inch or more long and across.

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Anemones, or wind-flowers, grow in colonies on clean grassy openings in the woods. Each plant is a wire stem supporting a whorl of feathery leaves. Above that a five-petaled rosette, pink or pearl white, flutters in every breeze. Bloodroots grow among them, and the pink striped star of the spring beauty. This nods from a fleshy pink stem and has thick, grassy leaves. Like many wild flowers, it shuts its eye at sunset, and when broken from the stem. But it revives in water. Its glistening little face looks newly rain washed.

#### Sweet Miss Violet and Her Neighbors

The buttercup looks wet, too. If you hold a blossom under the chin it reflects a yellow spot. It is found as early as May, and continues

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# m wild flowers a spanion Flowers o

## How Flowers Make Use of Their Bee Visitors



it has a wild, sweet odor.

In the forests around the upper lakes, the Indian moccasin flower grows. From a

stout stem. between two large veiny leaves, swings a pouch. Another name for it is lady's slipper. There are several varieties, some large enough for a big dolly's shoe. One is white striped with pink. Another is golden-yellow, lined with purple. The whole plant has a primitive, wild-wood look as has Jack-in-the-pulpit, and The Indian the Indian pipe. pipe is the "ghost flower" of northern woods. It is a true flower, but it grows like a fungus. Fleshy stem, scale-leaf and pipe-bowl flower-cup are all waxen white, as if they were little spirit plants come back to their earthly playgrounds. When picked they turn black in your hands, and decay

The eastern Rockies have so many beautiful flowers that it is not easy to say which is the best beloved. All the high plains below Denver are "green and blossoms in the spring, gold and blossoms in autumn." The The Flowers pale lavender bell, of the Eastern spotted with yellow and Rockies brown, of the Mariposa lily, is as fine as any garden flower, but it is not common. On the high plateau the Yucca, or Spanish bay-

quickly.

them.

And tread softly among

Where many people are

onet, blooms in June. From a flat circle of sword-shaped leaves rises a stalk three feet high, hung with drooping tulip-shaped bells in white and pink. Thick stemmed, fleshy-leaved cactuses have brilliant flowers, often as big as peonies, in white, orange and blood-red. In the hot sun of deserts these dry plants seem to burst into flame.

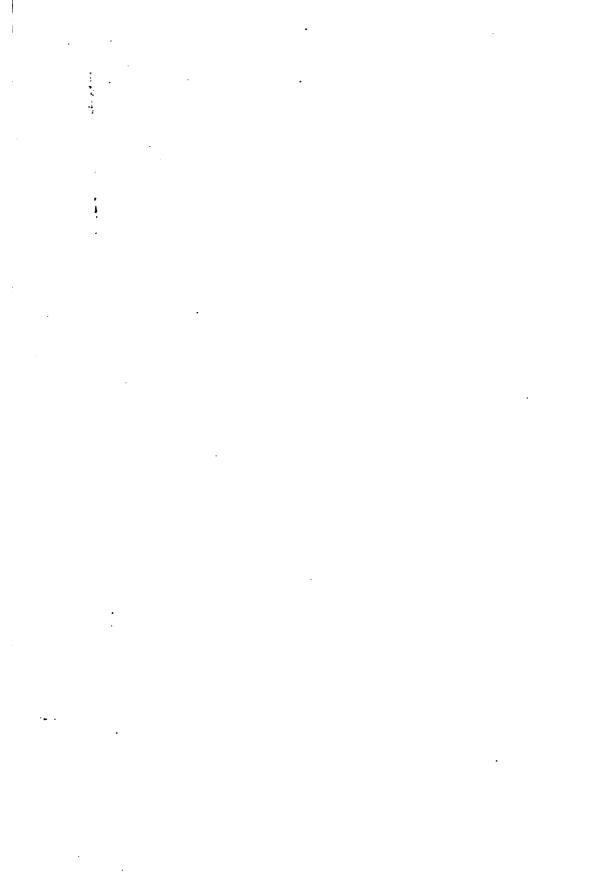
California has many kinds of wild flowers—those of a foggy, windy coast; a fertile, sheltered valley; a warm, dry, sandy region, and snow-capped mountains. As John Muir the poet of the Sierras, said: "California is a sweet bee-garden—a bed of honey-bloom." But it is

This is how the common sage takes advantage of the bee's visit to distribute its pollen. The anthere are shaped like a reversed C. In Fig. 1 the pollen-bearing anther is at the top of the C, the old, used-up part at the bottom. Fig. 2 shows you what happens. As the bee pushes the barren anther upward in entering the flower, a hinge arrangement tips the pollen-bearing anther down so it brushes her back and the pollen is

and the pollen is acraped off. Above the anthers is the pistil, drooping downward. As the flower gets older the pistil drops lower and then it brushes the bee's body; it is sticky and collects the pollen left there by the anthers of other flowers.



# D KNOWLEDGE alifornia Poppy



Here are the most common poison plants. Upper left, monk's hood; upper center, berries of poison ivy; plant with lavender flowers, one of the lobeling. The delicious-looking black berries grow on the deadly nightshade. Below, at the left, is the deadly amanita and on its right the jack-o-lantern fungus which although not deadly would, if eaten, make you very sick.

# IN THE GREAT WORLD OF NATURE FOISONOUS PLANTS

world got the com full of fidget-y ls. Instantly forty ight eyes became ig question marks. this morning at had to say to little on't eat that, Billy

good for you'."

th I were an Indian,
woods and eat what
d impatiently.

ndian boy would be that. If he were, 'er live to grow up

ne prettiest little girl yed, rosy - cheeked a German Louise me in, out of breath, ith a spray of vine om a vacant lot earby. The teacher "See the three, broad, notched leaflets together, at the ends of the branches? Their names are

Touch-Me-Not. This

Poison
Is the poison ivy that
grows nearly everywhere in America. It

is often mistaken for the Virginia creeper, but that has five leaflets. The poison ivy sometimes trails along the ground, but it likes best to clamber over rocks, fences, bushes, and to climb tall trees. Every part of the plant is poisonous to the skin of most people. The hands swell up to twice their size, and have a dozen kinds of burning, stinging, aching pains all at once, for days and days. Poisoned hands should be bathed with baking soda water, and bandaged with witch hazel, They should never be out



#### Leaf of the Poison Ivy

that burning bush! That is our other 'mustn't-touch-it.' It is the poison sumac. This little tree with its long, Sumace Are Bountiful feathered leaf, made of many willow-like leaflets, is often mistaken for the true sumac. that has its little flowers and seeds in a stiff wine-red cone at the top of the stalk. The flowers of the poison sumac are in a drooping spray. Both give us beautiful autumn leaves of flaming red. All the other poison plants in our woods and fields are 'mustn't-taste-its.'"

#### Other Harmless Plants and Their Dangerous Twins

One boy who had been in the country in summer said he had caten the sweet, crisp pith of a blade that he thought was calamus. It

"See the three, broad, notched leaflets together at the ends of the branches?
. . . This is the poison by that grows nearly everywhere in America."

Berries red, have no dread,
Berries white, poisonous sight,
Leaves three, quickly flee.

to the face. That is Lesson Number One in 'Plants that Every Child Should Leave Alone.'"

"Can we have Lesson Number Two right away?" asked the boy who had dug up the dandelion.

"Lessons two and three, four and five will be held at four o'clock every day this week, Find Out in Wild Garden. You All About the Iou are clever at drawing, Johnny-Jump-Up, so you may make pictures on the blackboard with colored crayons, showing every part of this dangerous plant, then you will always know it. The rest of you may find out in books at home, everything you can about poison ivy, and write a story about it."

As the children scrambled into the Wild Garden at four o'clock, the teacher exclaimed: "Look at

#### The Poison Sumac



This is the poison sumac. "This little tree with its long, feathered leaf, made of many willow-like leaflets, is often mistaken for the true sumac. But that has its little flowers and needs in a stiff, wine-red cone at the top of the stalk." Poison sumac berries are white.

He was so ill that be called. ous plants look like res, and taste like resnips can not be that grow in garplants with muchr-like, curly leaves led.

ison Fool's Parsley

·etty feet anygid sawleaf-, big : top umclussumbeen blosranchpotted purne boys d the

every-

nell its When this plant is young it looks very much like garden parstey and is often mistaken of. It for it, hence the name. It grows in waste places and neglected gardens.

nous. It can be han-

The children crushed

their hands.

ey smell just like a little l!" cried one girl. "Like lite mice I have in a

ant got itself into hiswisest man of old Greece
— was condemned to
death for refusing to
worship the Greek gods.
A drink was made from
k root and given him. It
sleep and he never woke

up. So hemlock is called 'the cup of death.' It is a regular tramp of a plant, marching along every dusty roadside. The water hemlock of the swamps is poisonous, too. It is called the spotted cowbane, as cattle are often made sick by eating the leaves. The stem is spotted

The stem is spotted with red. The blossom and roots are much the same but the leaf is not so curly."

#### The Yellow Buttercup's Poisonous Cousin

The next poison plant the children found grew as low as the violet. Ιt was just a knot of spreading handshaped leaves, with five and seven broad finger leaflets. Upright stalks bore a single seed Some of the children remembered that it had had open, shaped blossoms, like greenish but-

tercups in the spring.

It is a cousin of the pretty yellow buttercups. It belongs to the hellebore family, many members of which are grown in gardens for their beauty. One of them is called the "bachelor button." Powdered hellebore roots are used to kill insects and caterpillars on plants. The "white hellebore" is not a true hellebore. It has the parallel, veined leaves of the lily of the valley, and small green flowers set close on a stiff, fleshy stem. Verv young children have died from biti kind of rubber. Indeed, many sful people wear old gloves when iering flowers, to protect their ds from disagreeable juices, and i briar scratches that are often ful.

"There's one root I think Indians used," said Billy Boy; for Billy Boy was a boy who thought. "It is horseradish. You grind the root up in vinegar, and use it on boiled beef. Wouldn't horseradish in

## Jones Don't Mistake This for Wild Horseradish Wild grape juice

wild grape juice be fine on bear meat!"

#### It Looks Like Horseradish, But It Isn't

"Yes," said the teacher, "I think it would be. But this plant you are looking at is monk's hood, with horseradish - l i k e leaves. Its purple hood or helmetshaped blossom, grows loosely along a spike. belongs to the poisonous aconite The true family. horseradish longs to the same family as the garden radish, turnip and wild mustard. It has the same little four-petaled, cross-shaped blossom and podded seed."

Last of all the children hunted

around the rotting stumps and a fallen log, and along dry, grassy banks for the little umbrella-shaped The Pretty fungi that they called Little Wild "toadstools." Such Umbrellas pretty ones they found—white and cream, yellow, orange, gray, smooth and scaly and spotted, with white, brown and gray gills

#### Mr. Jimpeon Jamestown?

h, there's a m est o w son) weed, the teacher would neve e that stock with th ossy leave: hite bel s as big a: glories. thing else. poisonous e opium, ade from ed. You ever eat ed, musiny wild 11."

#### e Wild at Are Eat

and with horseradish-like leaves. Its purple, hood or helmet-shaped blossom grows loosely along a are spike. Fig. 1. It belongs to the poisonous aconite family. The true horseradish . . . dber-has the same little four-petaled, cross-shaped blossom and podded seed," but its root, Fig. 2, you see, is different from the monk's hood root, Fig. 3. The horseradish has a light-colored, thong-like root, hairler than that of the monk's hood, which is dark and cone-shaped.

Idren often mistake the perries for elderberries, est to leave them alone. sweet and mountainte beautiful in flower poisonous to eat. Wild acid that they often and throw little chilns."

#### PICTURED KNOWLEDGE

like ruffles underneath.

"They are just like the mushrooms mama buys in the market," insisted one little girl. "They are so good!"

#### Difference Between Tondstook and Mushrooms

"They certainly look like them; but, growing wild as these are, I think they are the death-cup fungi, The cap is smooth, pale, creamy white, and the gills and stems a bleached white. They grow in every open wood and meadow. Sometimes the cap is pure white or olive and scaly. This beautiful one with the yellow cap is the deadly amanita. It grows rich earth. around rotten stumps and in groups. The cap ange-red. Around

ly buried.

#### Jack and the Lantern in His Cap

and then a swollen bulb that is part-

"Those tricksy-looking ones growing together at the base, and bending away at every angle, Jack and are Jack -o' - Lanterns. the Lantern In His Cap The whole plant is a After nightfall the saffron-yellow. caps are often aglow with a faint light, like the heads of phosphorous matches when you rub them. There are good mushrooms in the woods, but people who have not made a special study of books on mushrooms and toadstools should leave

A Plant That Puts People to Sleep

all the fungi alone. A good motto for a child would be:

"All fungi in the woods and fields are toadstools."

#### But What Did the Indiana Eat?

"Why Indian boys and girls had to leave nearly everything alone. What could they eat!" (For Billy Boy was troubled about his little red friends-that-usedto-be.)

"All the nuts, many wild fruits, even sour cranberries, grapes and plums, if they had maple sugar mustard, wild on-

ions, wild rice. But so few wild plants are wholesome that the Indians were obliged to grow corn, beans and Many leaves, roots, pumpkins. barks and seeds that were unfit for food were good medicine. Indian children were watched every min-They were brought up on:

" 'Mustn't-touch-it. Don't that; it isn't good for you.' "

The boys were swinging their legs over the cement walk into the

#### POISONOUS PLANTS

ngle of growth of the Wild Garn. At last Johnny-Jump-Up d disgustedly:
"One might as well be a white "."

"It is just as much fun, and far safer." The teacher was smiling. "Run along, now, or Jack-o'-Lantern will have to light you home."

#### **Daffodils**

I wander'd lonely as a cloud
That floats on high o'er vales and hills,
When all at once I saw a crowd,
A host of golden daffodils,
Beside the lake, beneath the trees,
Fluttering and dancing in the preeze.

Continuous as the stars that shine
And twinkle on the milky way,
They stretch'd in never ending line
Along the margin of a bay;
Ten thousand saw I at a glance,
Tossing their heads in sprightly dance.

The waves beside them danced, but they
Outdid the sparkling waves in glee—
A poet could not but be gay
In such a jocund company!
I gazed and gazed, but little thought
What wealth the show to me had brought.

For oft, when on my couch I lie,
In vacant or in pensive mood,
They flash upon that inward eye
Which is the bliss of solitude;
And then my heart with pleasure fills,
And dances with the daffodils.

WILLIAM WORDSWORTH



# Some Curious Homes of Animals

They are cliff dwellers, gluing their nests in colonies to the rocky walls of caves, above the sea, in the far-away East India Islands.

EARLY all animals except grass eaters, that live in erds in the open, and insects that e in the sun only a few days weeks, have some kind of a me. Lions live in natural caves. lves and foxes in dens and ars in hollow trees. But all the ds, most little furry animals and bees, ants, spiders La' Nesta and wasps make their l to Eat homes. The only tools have are their feet and iths, but they use these in the erest ways for spades, saws, ers, needles, weaving shuttles,

knives, shears and trowels. They make the cleverest, cosiest homes in which to hide and sleep, store food and bring up their helpless babies in safety. Caterpillars make a gummy silk to wind about their bodies, bees make wax cradles and honey jars, and spiders have a silk for weaving their wonderful dens and fly traps. But did you ever hear of a bird that draws threads of saliva from its mouth and weaves a nest with them?

Wung Foo, the little Chinese boy, could tell you all about that,



would give you bird's nest soup for dinner, but he could not show you where to find such a nest. It is made by swallows, very much like those that make mud villages under

the eaves of barns. They are cliff lwellers, glueing heir nests in colmies, on the rocky walls of Veaving Glass Houses C a V e S the Cliffe above ne sea, in the far way East India The bird lands. esses its tongue rainst the rock to sten the end of a read, then flies .ck and forth. lling out a cord at dries and haras almost at once. d weaves it into basket nest the and shape of a rter egg shell. s a pretty amber olor, as clear as s, and melts in water. It is de in pitch cness, in the it, the birds flylike bats.

tird That Builds a Tenement House

f all our native s the orioles the cleverest ouilders, weava hanging e or pocket inner room is for mama and the babies. The papa bird sleeps in the entry to keep an eye out for burglars. The buffalo weaver birds join company and build several nests together. The so-

A House with a Real and a False Doorway

ciable weaver bird South of Africa makes a tenement house around the trunk of a stout tree, and under an umbrella roof big enough to shelter several men. Like hua Tenement House Around m a n Tree Trunk village the bird colony is built up slowly. single pair of birds makes a nest with an awning of long, tough grass. The next year this pair returns bringing their children. Year after year the nests increase, until the tree is surrounded and the sloping roof ex- tended, to shelter dozens and even hundreds of families. Bats, insects and snakes find shelter there, too. It is a noisy tenement house, everyone crying, scolding and quarreling, but all safe under a conical roof that is strong-

The real entrance to this weaver bird's nest is at the bottom. Half-way up is a mock opening, made to deceive possible enemies. Mama Weaver and her babies are in the rounded out part at the top. There is a strong partition between this and the "spout" to keep the eggs and babies from falling to the ground. Papa Weaver is pecking at you over the edge of the log.

an elm bough fifty feet in the er than the roof of many a bush-But in hot countries there are man's grass hut. The bird that s that weave double nests. The weaves this wonderful tenement-like

## PICTURED KNOWLEDGE

Hatches Her Eggs with an Incubator!

nest is only six inches long.

What Do You Think of This, Girls?

The tailor bird sews her nest.

She selects a large, strong leaf growing from the tip of atwig. All around the edge she pierces a row of tiny holes with her bodkin bill. Manuelo, the little Filipino boy, lies very still in the woods and watches her do She finds another leaf of

The Australian mound-bird makes a nest of leaves and grass and lays its eggs in it. Then it piles more leaves and grass on top of them until they are buried two feet deep. This is how the finished mound looks. These mounds are sometimes forty-five feet in circumference. The leaves and grass decay and in so doing produce heat, as you know, which helps hatch the eggs.

The Brazilian "Johnny Clay" and His Home

the same size and shape and makes holes in that. Then she strips bark from tough weeds, splits it into threads and sews those leaves into a

deep bag. In the bottom she makes a bed of down.

Two Burrowing Birds

In Australia, that is noted for its queer plants and animals — blue gum trees, kangaroos and laughing jackasses, which are parrots that heehaw — there

Here is the oven-bird of South America and his nest. It is built of clay on the bough of a tree, and has a long narrow opening. It is like the clay ovens used by primitive peoples and from it the bird gets the name. The people of Brazil call this bird "Johnny Clay."

is a tiny bird, three and a half inches long, that digs a nest. It is a flashing jewel of black, white, gray, brown, yellow, orange and blood-

red, and is called the diamond bird. It tunnels a gallery for two or three feet into the earth, then hollows out a perfect three-inch globe that it

lines with bark fibres. This work is, of course, done in complete darkness.

The puffin, a queer water bird of the Faroe Islands, makes a V shaped burrow with two entrances and a nest at the bottom. It folds its wings and webbed feet

and toboggan-slides to its home. It sleeps standing upright, as solemn as a fat alderman.

Jealous Mr. Hornbill of the Far East

You know that our native woodpeckers, owls and some blue birds nest in holes in The trees. hornbill of the Far East does this, too. It is as big as a pigeon or a crow. Whenmama bird has moved in, lined the nest with feathers and laid two eggs, papa

fetches clay and walls her in, leaving a hole for the tip of her beak. For two months he feeds her and the downy babies with fruit, through he hole. But if Mrs. Hornbill reaks that wall or lets another bird eed her, Mr. Hornbill goes away nd never comes back.

## Feathered Barons in Cliff Castles

Like many other water birds, enguins live in colonies. Thousands

Bird City come together, every

Squares spring, on every arctic

i Strate sea beach, and hold a

ngress. Seting a wide ige above the they fetch nes and lay a nd - break 11 around ee sides of a ce that covs several The in-65. is sure ked off in ares, with eets and Each ire is a nest. castle of a that no r bird ever ırbs.

### Beautiful se-Roomed House

of South ca, that on marshes, I d dome

The kingfisher lives on fish and builds its nest in the banks of streams and lakes. In the picture the bank is cut away showing you a cross-section of the kingfisher's tunnel and nest. The birds spit up undigested fish bones and form them into a cup-shaped nest for the pure white eggs of which there are usually six.

enough for a man to stand on.
The one small door is on the least exposed side.
Inside are three rooms.
and the babies sleep on beds

room. The middle room is a pantry always stored with such dainties as fresh frogs, fish and water snakes. When the owner is at home he sleeps inside the door with his beak out. Like the English magpie he collects bright objects, bits of metal, china, glass and pebbles, with which to decorate his front door yard.

# And There Are Bird Play Houses, Too!

This sounds like a fairy tale, but it's as true as blue. The bower birds of Australia and New Guinea build pleasure houses. For bringing up their babies they have ordinary nests high in the trees. But on the ground they build summer houses and lay out gardens. One kind builds around a woody plant with a stem as long as a par-This asol. uses for a tent pole. It digs up earth t h e around the roots and piles Then it makes

a cone for support. Then it makes a leafy tent, using an air plant that play Grounds will not wither (think of for Bird that!). The house is evergreen and waterproof, nearly two feet high, with an opening in front. In front the gar-

# ■ PICTURED KNO Like a Little Old Man

sixty feet in the air in a tal a hands clasped. Isn't be their nests in the trees until

A Mole Hill in Cr.

mole hill is a round room, so r, and connected by up and lirections. The little animal

The Trap-door pider That Plays Jack-in-the-box"

Don't you ink a Jack-ine - box amusg! You press a utton, the lid ies open, and lack" pops out, springs, and akes you jump. here is a spider nat is a live ack-in-the-box.

is the trapюr spider. igs a hole in ie ground as g around as a nny and about foot deep, and

Wasp "Cliff-Dwellers"

akes a cover A cross-section of this bank shows how the mason near a hole, sits a r it of earth in. The entrance to the burrow is a mud-built tube lively little ad cob-webs tube. There are also holes along the sides, by which ground squirrel lat fits as the wasp can go in and out.

woodchuck, paws folded, barking ugly as the lid of a watch. Then lines nest and cover with silk and like a nervous little dog.

ngs the door th a strong Mrs. nge. ider pops in ıd out of r house. if you ind one of doors ose 1 might not able to The en it. can ner it shut her legs iced against walls.

The Jack-in-the-Box Spider and His Door

The trap-door spider "digs a hole in the ground as big around as a penny and about a foot deep, and makes a cover for it of earth and cob webs that fits as snugly as the lid of a watch. Then it lines nest and cover with silk and hangs the door with a strong hinge. . . . Even if you found one of those doors you might not be able to open it. The owner can hold it shut with her legs braced against the walls."

, Interesting Little Prairie Dog Town Of the little furry animals it is

hard to say which one makes the cosiest home. There are rats. mice, squirrels, prairie dogs, gophers, moles and many others. Many people think a prairie dog village the most interesting thing any child could ever see. On our dry plains, acres and miles of wild country are dotted with hillocks two feet high. On top of each hillock, about as big as a

> "Үар, yap, yap!'' they yelp. But if you go too near them they vanish with saucy flirts of their tails: "Goodby, I have business below."

> Don't you wish you could follow them? If you were a brown-

ie you could go with them through miles of tunnels, and see their cosy nests lined with moss and fur. And

cle, tunnels run away in several directions. What the middle room is for, no one knows. The little animal sleeps in one of the passages, and has a nursery where several tunnels meet.

#### Clever Caterpillars

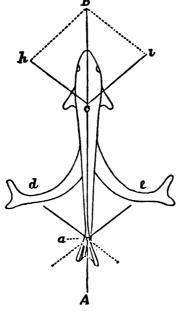
We will tell you about seal, beavers, water spiders and nest building fish in another story. There are just two more that we have room for here.

You have seen the nests of tent caterpillars, haven't you? colony of caterpillars enclose a branch of a tree in a web of silk, eat the leaves there and spin their cocoons. Birds could easily tear that web in pieces and gobble up the squirmers, but they do not seem to know it. In Mexico a Caterfillars colony of caterpillars that Live in a Bottle weave a bottle shaped bag of a parchment paper, as tough It has a small as a wasp's nest. opening at the bottom. Inside, the pupas are hung up by the tails.

#### Sweet Little Home of the Field Mouse

The dearest home of all is the nest of a field mouse. Little bright-eyes of the meadows, this tiny animal is only two and one-half inches long, tail and all; only one-sixth the size of a house mouse. He is Little Brown red-brown with a white Man in the White Vest vest, and is so cunning when he sits up on a grass stem to wash his face, or to eat the kernel of corn that makes a meal for him! If you ever found the nest you would be sure to think it had been built by a bird and filled up with loose grass. It is a couple of feet from the ground, fastened to grasses, is as big as a goose egg and woven of grasses in a ball. You would see no opening at all, but from five to nine thimble babies are packed away inside. Mama and papa mouse can push the grass aside anywhere to get in and out, and the hole closes again at once. And then the little family of field mice is safe in its cosy, round home, as snug as the apple in a dumpling.

# How a Fish Swims



Switching His Tail for You
Little Priend Pish is here showing
you how he swims. The line a-b indicates the center of his back. His "center of gravity" (see dictionary) is at c.
The lines d-a and e-a show the motion
of the strokes that drive him forward.
The lines c-h and c-i show how the fish
swims in a zig-zag and not straight
ahead.

swim? That's isier done than The easy, id. raceful way in hich a fish seems move through e water is really lite complicated. ou will say that a h swims with his It would be ore nearly true to y that a fish swims ith one fin and

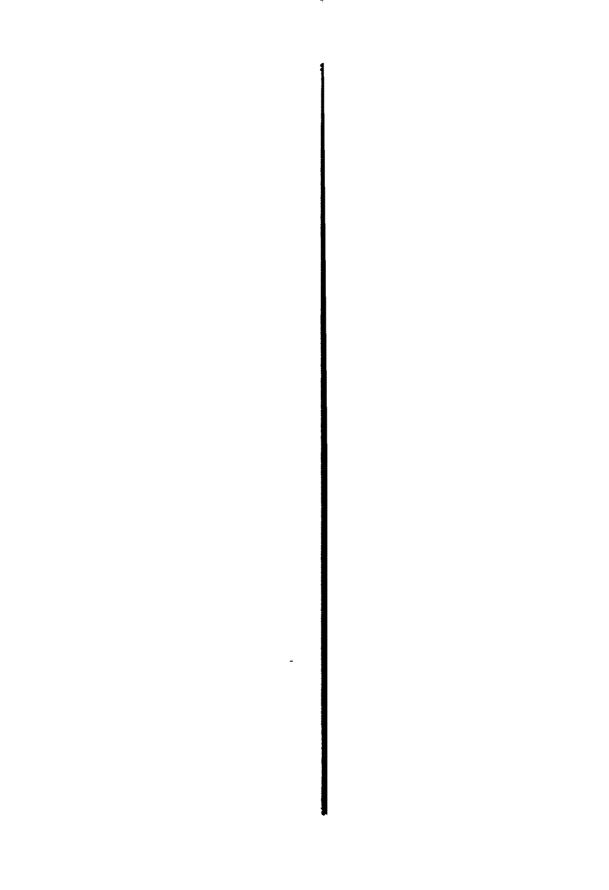
OW does a fish

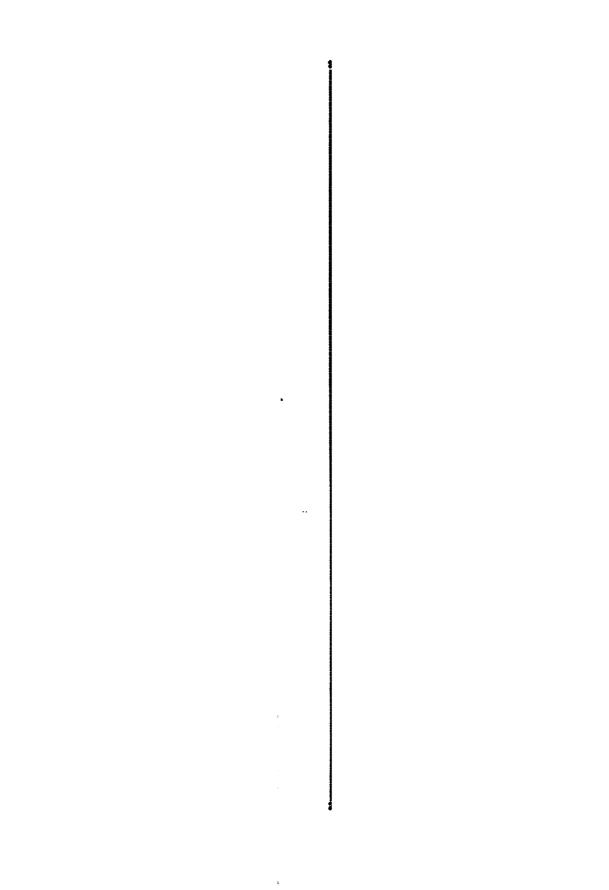
ers himself with the others. For it by the use of his big tail fin that e fish can dart rapidly about, jump to the air and swim steadily ainst a swift current or through y waves.

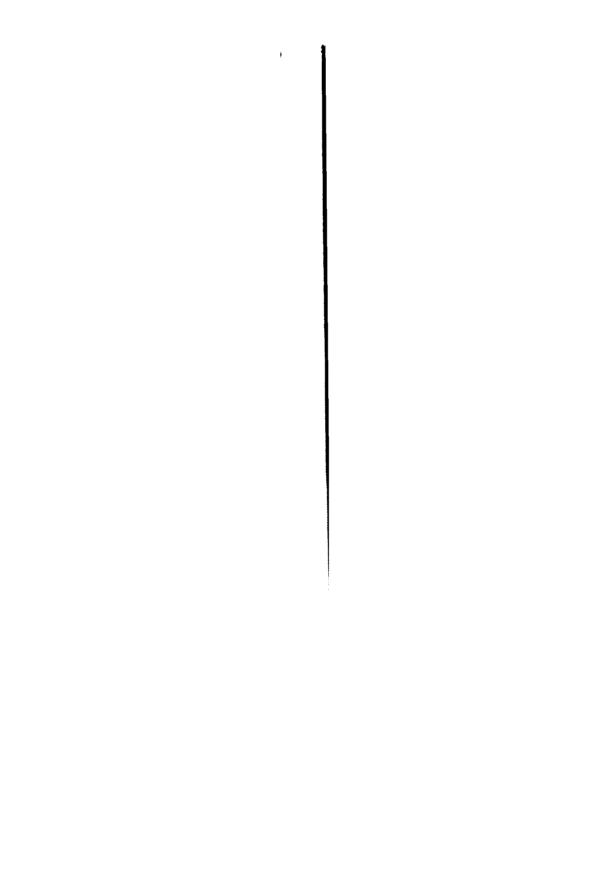
Water animals, like the whale, use up and down stroke of the tail swimming, but most fish move ir tails from side to side. For ample, a stroke to the right is en with the tail partly or wholly ded, then the return stroke back to traight line is stronger and push-

es the fish forward through the water obliquely to the left. A mild stroke of the tail to the left is followed by a strong stroke back to a straight line again, which carries the fish forward a little to the right. So really the fish travels not in a straight line, but in Watch a a zigzag. gold fish and see.

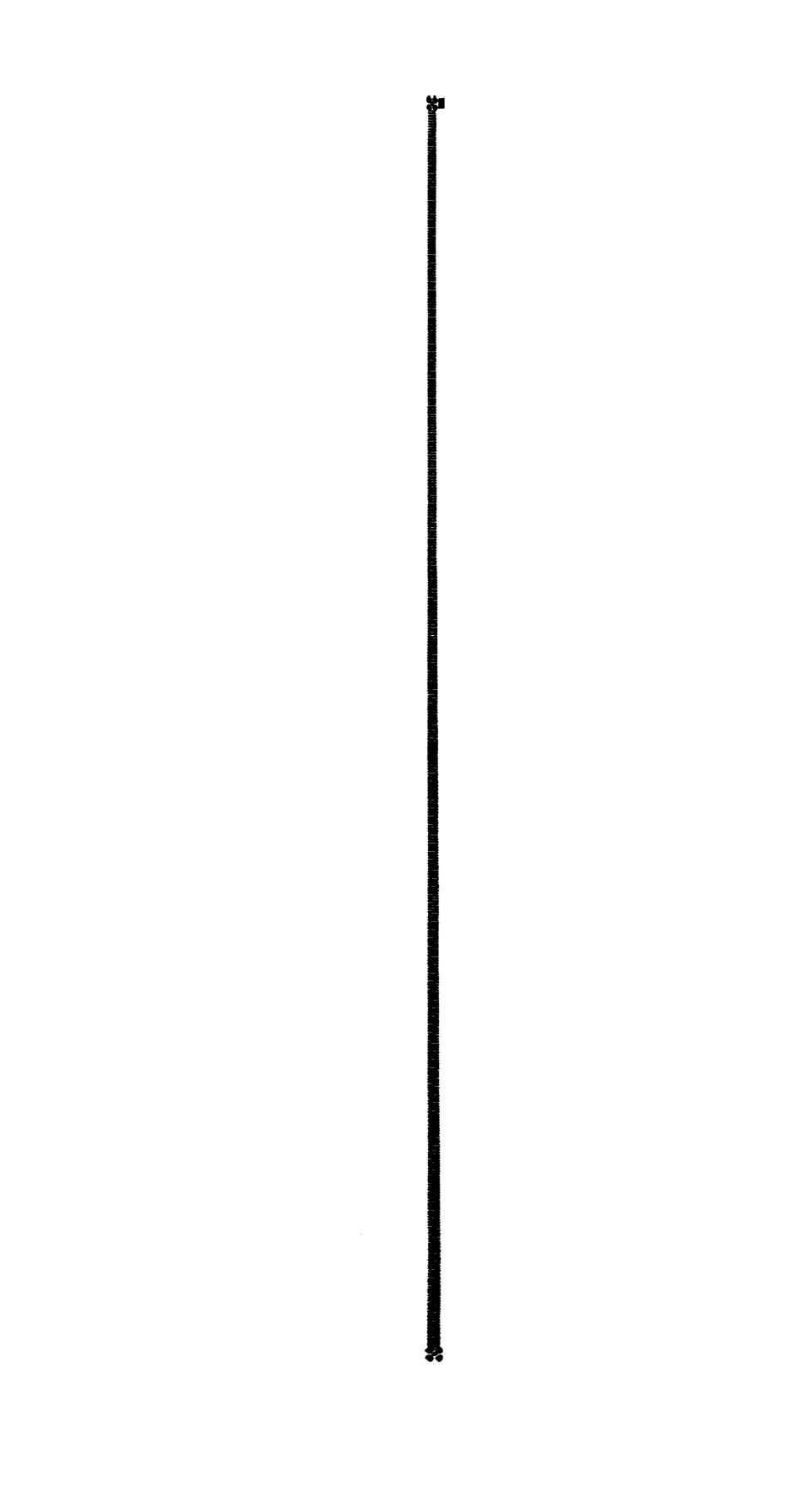
The fins on the sides of a fish's body are not supplied with such large muscles as those which control the tail fin. The chief use of the other fins is in balancing and turning. They are rudders and paddles which the fish uses to keep his course straight. By spreading them out or closing them, giving the water an occasional stroke with them, he keeps his nose pointed toward the place he is swimming toward, and relies on the strong back sweep of his tail for speed.







This is the proteus, a fish that lives in the pitch dark, underground rivers of the Alpa. It has two dark spots on each side of its bead where the eyes would be if it had them. It is almost white, with bright red gills and is shaped like a snake, you see. Its fins are more like radimentary limbs.



# SOME STRANGE WATER ANIMALS

the point of the ribbed, tent-like roof, a sea anemone takes up its home. The crab feeds its companion by How the Crab pushing up dainty mor-Furnishes the sels with its claw. When the crab outgrows its house, and is obliged to move, it pries off its flower-like chum and helps it to move, too.

# Lamp Bearers, Electric Batteries and lnk Throwers

One of the prettiest things you could see, in crossing the ocean, would be a jelly fish, is a fier with a disc and tail, ing through the wate

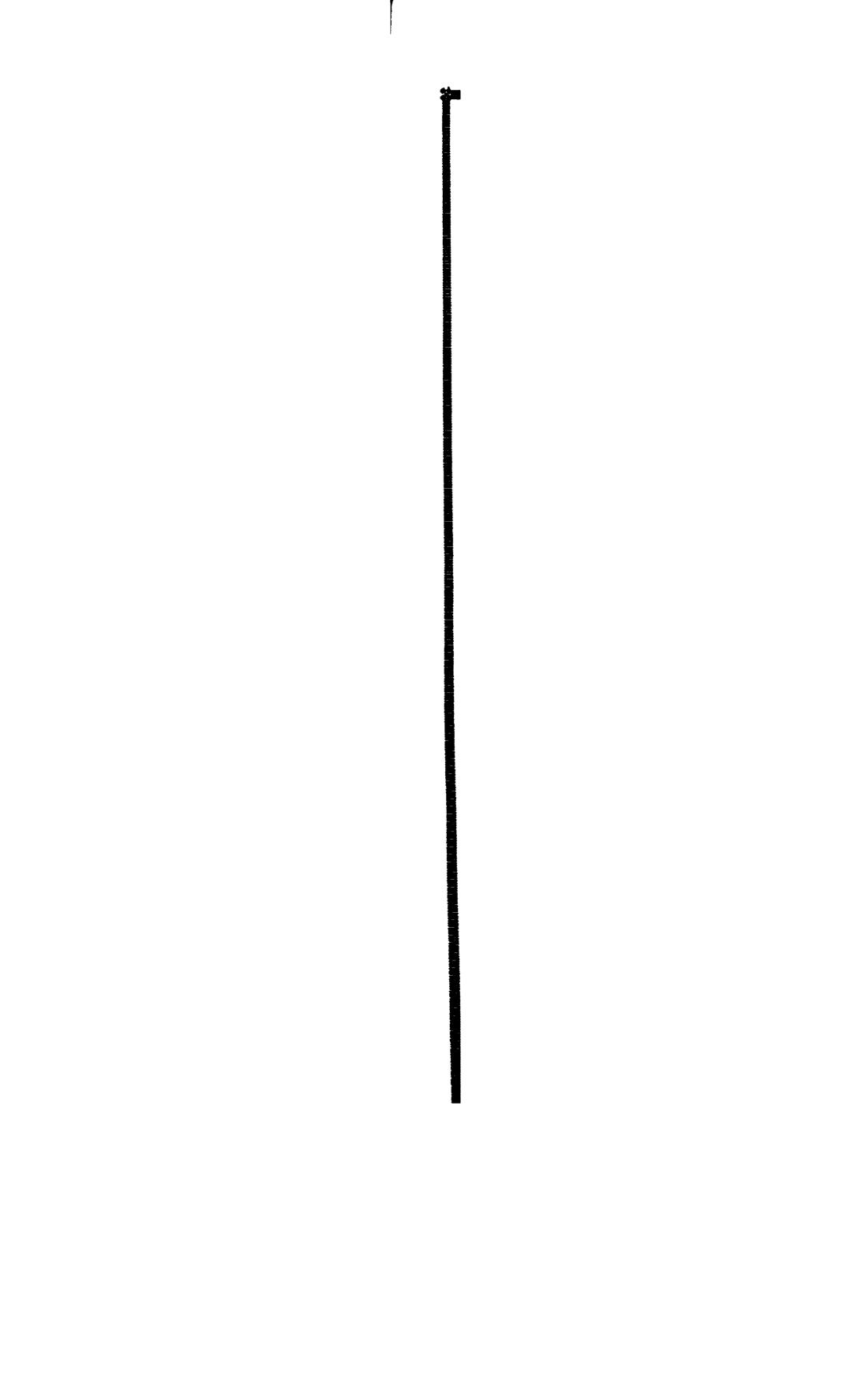
You have heard

Fish that eel, have

Carry Electories South

snake-like fish oftellong, it can knock do

A Fish that Climbs Tree:



# Betwixts and Betweens

You know that frogs live partly in the water, partly out. animals do that—the beaver and muskrat, the seal and walrus, turtles and snakes, the crocodile and alligator. One of the oddest ones is the duckbill, or water Mole, Duck and Fish. mole, of Australia. All in One has fur like a beaver, webbed feet and a bill like a duck. It lays eggs like a bird or turtle, is cold-blooded like a fish, and it makes a tunnel house in a bank like a mole.

These water-land animals are clever about solving difficulties. Eels wriggle across a marsh to distant

pools. A New Zealand goby leaves the sea to catch clams on the beach. Crabs in the West Indies march Water People overland in big armies, that Travel in the night. It really is no queerer for a fish to walk on its fins through grass than for a land-nesting bird to dive, swim and feed under water. But it seems queerer, and it makes us all think:

Where do furry animals, feathered birds, scaly fish and little boys and girls begin to be, and where do they leave off and begin to be something else?

"That," as a wee lady baby said, "is the puzzle of it."

# The Whale

THE inhabitant of another planet descending towards ours in a balloon and surveying it from a vast height, would say to himself, "The only creatures that I can discover there are from one hundred to two hundred feet long, their arms are only twenty feet long, but their superb tail, thirty feet, magnificently beats the sea, and enables them to advance with a speed and a majestic ease which make it very evident that they are the sovereigns of that planet."

And by and by he would add: "It is a great pity that the solid part of that globe should be deserted, or at best peopled only by creatures so small that they are invisible. Apparently the sea alone is inhabited and by a kind and gentle race. Here the family is held in honor, the mother nurses and suckles her young ones with tenderness, and although her arms are very short she contrives during the raging of the tempest to protect her little one by pressing it to her vast body."—Michelet: The Sea.





# OF COMMON THINGS HOW PEARLS ARE FORMED

The "pearl coast" of Asia might well be bound with a rope of lustrous, white pearl beads. Divers, yellow and brown and white, have been bringing up the ocean gems for centuries.

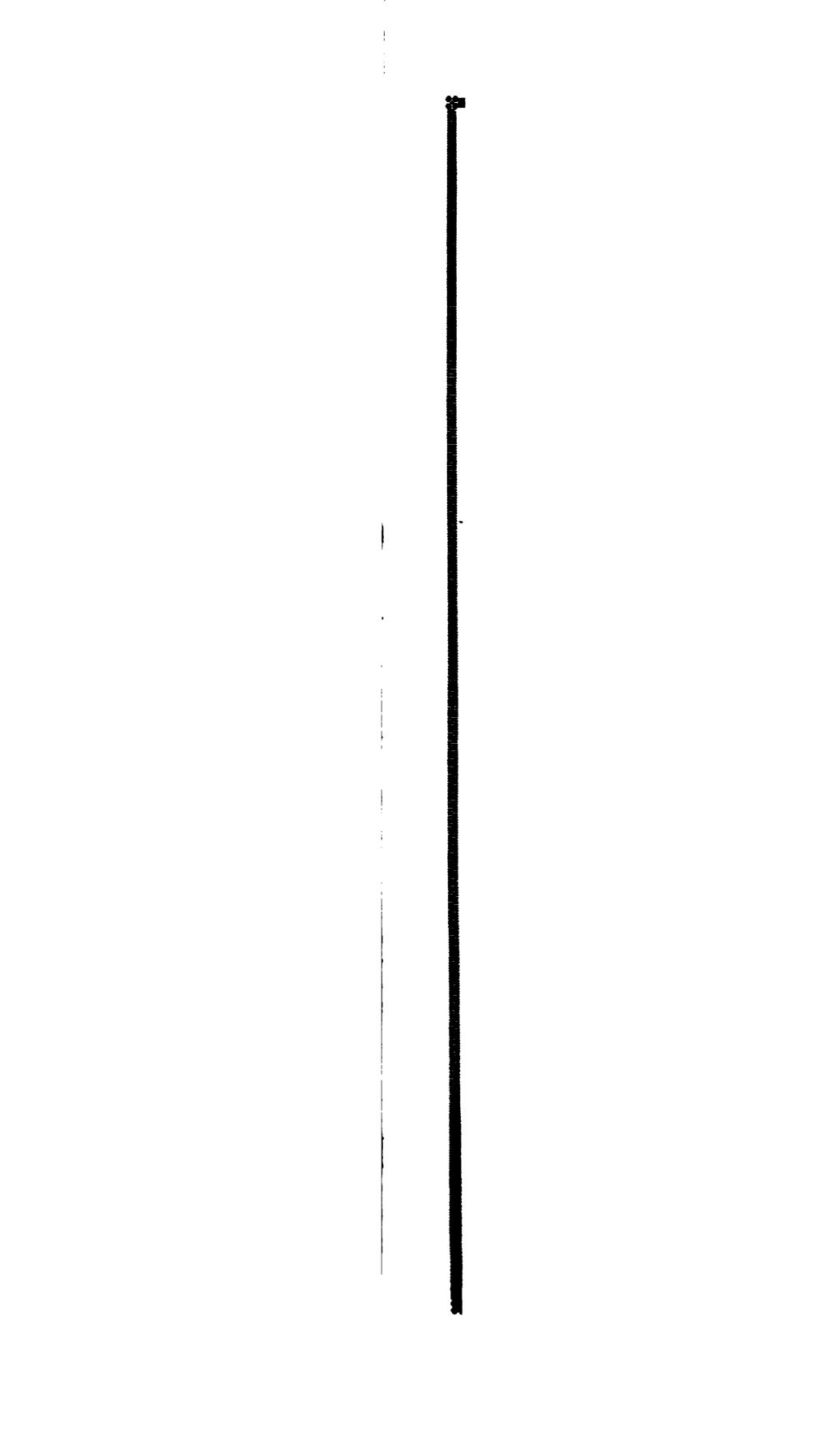
DEARLS are found in the shells of sea and fresh water oysters and other shell fish. They are made of a limy secretion of the animal, the same material that lines the shells. This nacre or mother-of-pearl is formed of thin plates, or skins, one over another, very smooth, semi-transparent, and with a wonderful play of colors like the opal. Sometimes a grain of sand, or oth-Trouble in er foreign body gets Their Little inside a shell and Insides scratches the soft body of the oyser. If unable to dislodge the particle, the animal encloses it in A few pearls have been ound two inches in diameter, but

most are the size of peas or mustard seeds. They are round, button shaped or pear shaped, and of all colors from jet black to pure white, with all shades of pink, lavender and smoke. Next to white in beauty are those that are The value of a rose-colored. pearl depends upon size, shape, color, luster and freedom from flaws. Because it is hard to find any two exactly alike, matched pearls in a necklace have an added value. Fine black pearls are found off the coast of Lower California, and fresh water pearls in the Mississippi River and in its tributaries, and in several European rivers.

STREET STREET





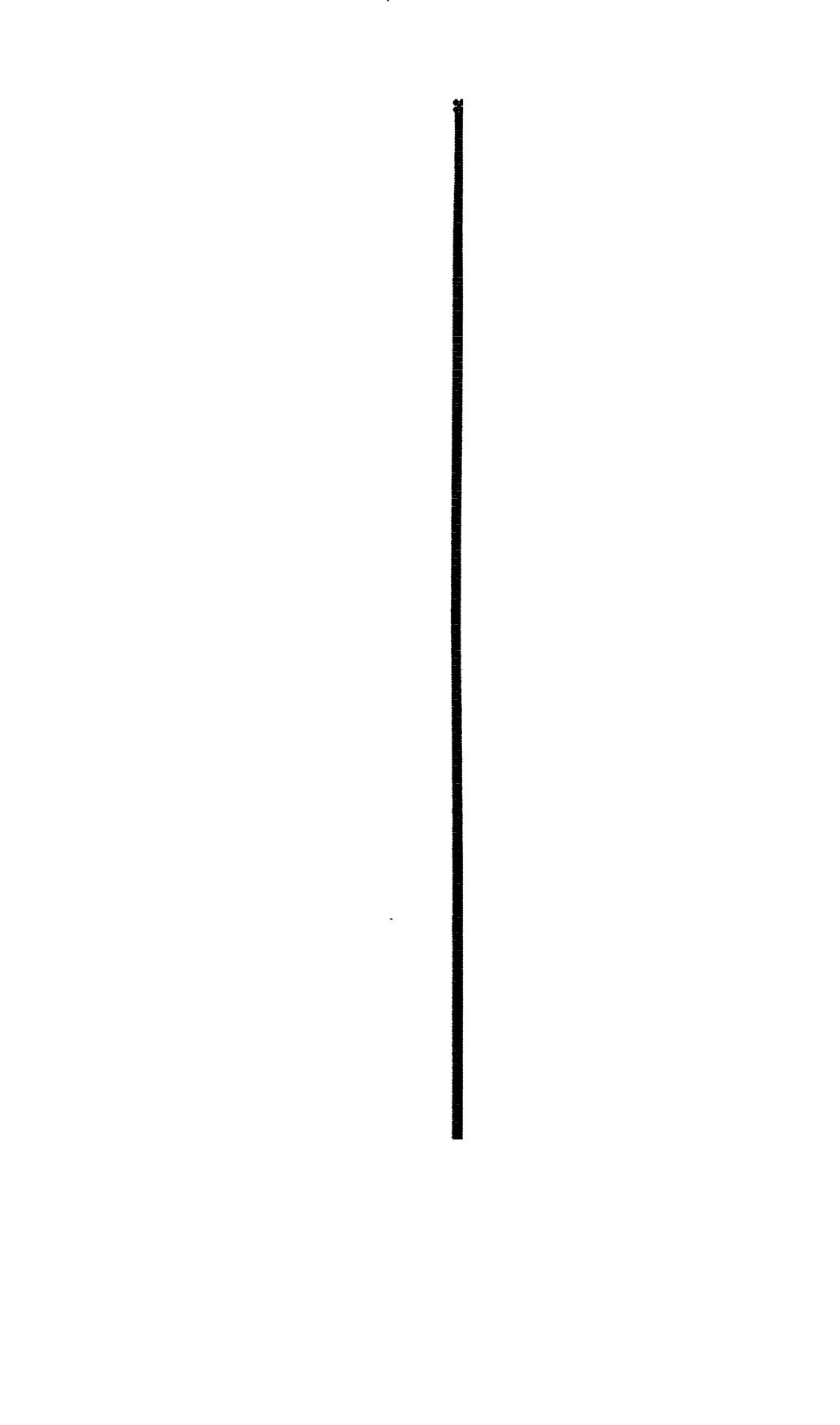


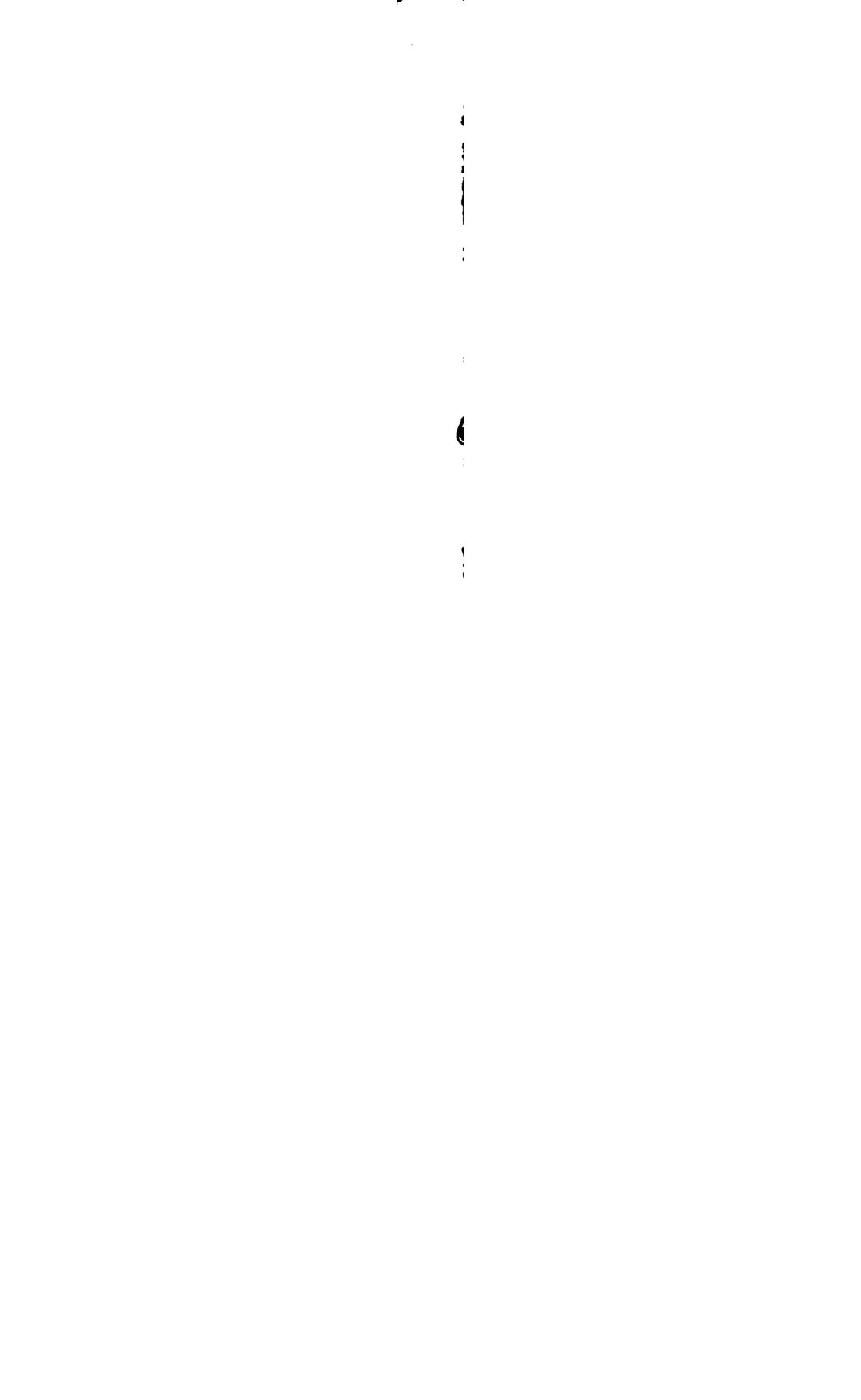
# THE PEARL INDUSTRY

enough to last him on his journey down and up again—much as a safety, he pulls camel takes in a good supply of and is hauled water before he starts across the desert where he will not get a new supply for some time.

ply of breath i the boat above. in much the sa such crude dev

Queensland Pearle-Exact Size







"When they had all they could carry the bees circled straight upward and made a bee line' for home, even if a mile away. How they did it is a mystery. They dropped to the hive, never missing the small opening by an inch."

> "The Queen was in the parlor, Eating bread and honey."

AYBE it was only honey. But she did not like being shut up in her parlor, all alone. She was a pretty, long-bodied queen bee who had just crawled from her pupa case cradle. The parlor was an inch high, a third of an inch wide and pear or bottle-shaped. The walls were of varnished wax, with no opening. It was as dark as your pocket in There that parlor. The Royal was no doubt about Prisoner in Her Parke its being a prison, for the queen had turned 'round and 'round in it and had found neither a window, nor a thin place that she could break through. Suddenly a hole appeared in the ceiling. She pushed her head up, and put her long trunk or licking lip through the hole.

"Squeak!" she complained, in a piping voice. "Please, I want

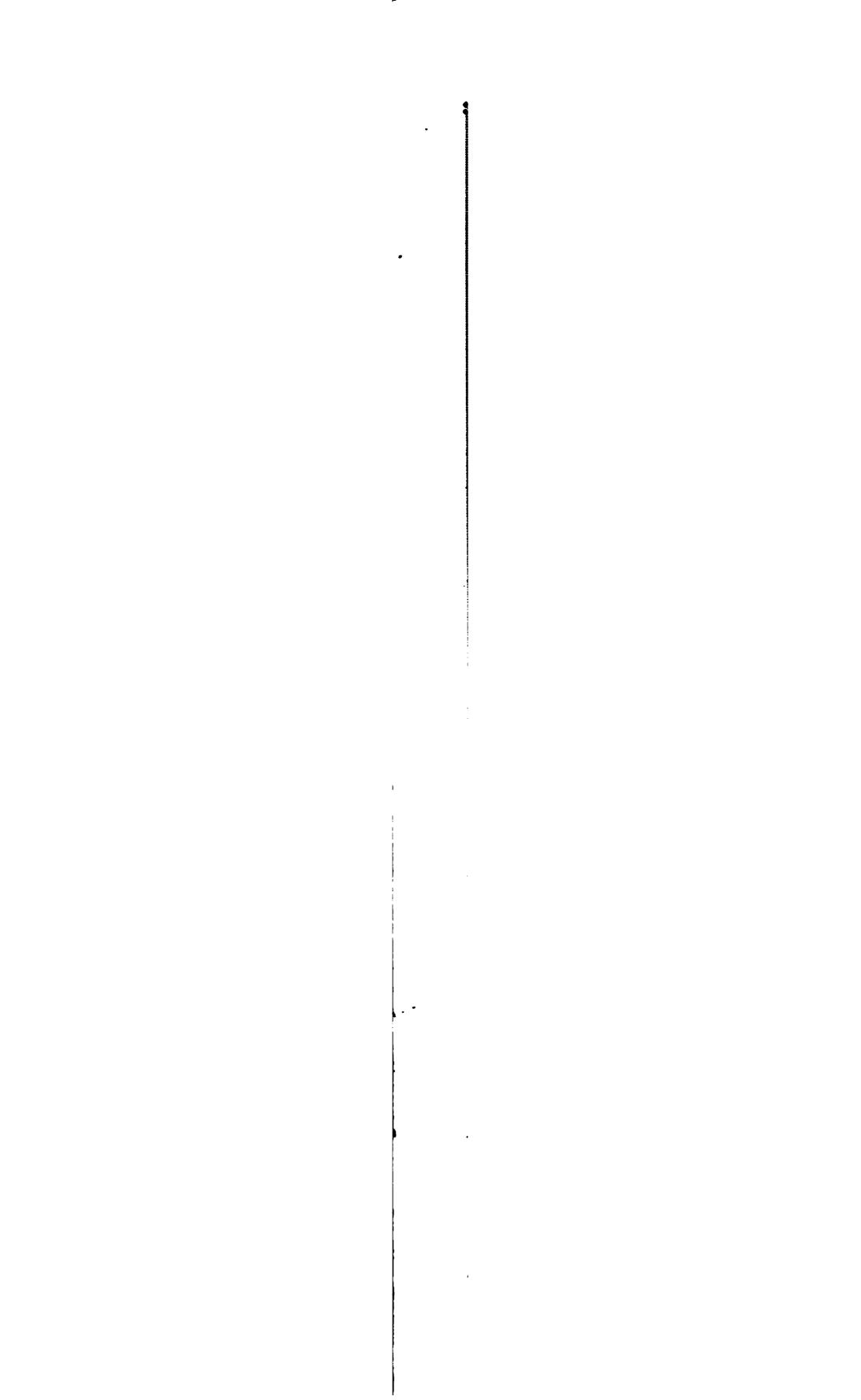
to get out."

A drop of honey was put on her lip by a maid of honor, one of a circle of worker bees that guarded the hole. Another and another drop trickled down until she had had enough. Then she cried out again.

"Hsh-sh-sh!" She was caressed and soothed by the antennae, or feelers of her anxious attendants.

"Squeak, squeak!" The food had made the little queen stronger.





## In the Bee's Wax Factory

The first picture shows a festoon of workers clinging to each other while the wax-forming process goes on. They hang like this for twenty-four hours at a time. On the right is a larger mass of wax producers. A high temperature is necessary for the formation of the wax, and for this reason the bees cling together in a big bunch just as children cuddle together in bed on a cold night. The center picture shows a worker producing wax. You can see the plates of wax appearing between the sagments of the bee's abdomen. A worker bee must eat from sixteen to twenty pounds of honey in order to produce one pound of wax.

The whole hive was excited. The temperature suddenly went up to over a hundred in the shade, for the blood of angry and excited bees gets The lazy blunt hot. Grew so Hot They Started the Fane! bodied male drones went out to loaf on the roof in the sunshine. Some little worker bees came to the low door and fanned the air into the hive with their wings. Inside, other bees fanned bad air out. Such a humming noise as though electric fans were whirring!

Things quieted down, but all work was stopped. The prisoner cried piteously. The maids of honor petted and fed her through the hole. The old queen sulked and made rushes, and darted about trying to find other royal cells. If there were any, they were guarded. By and by she brightened with an idea.

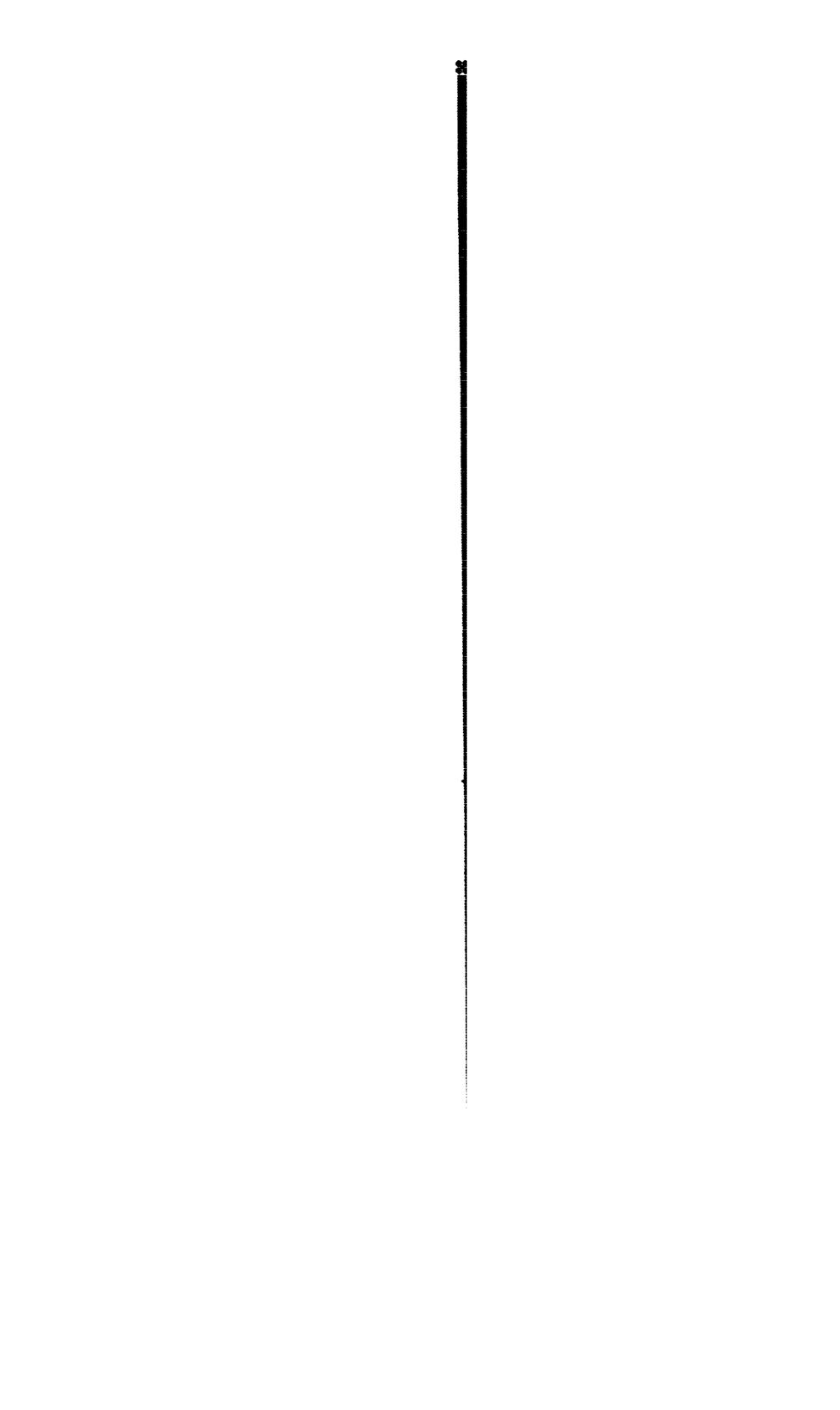
#### The Old Queen Resolves on Exile

"There are too many bees in this nive anyhow," said the old queen, angrily. "Who will follow me into exile to found a new colony?"

That was sensible. It was the old queen's duty to go when the hive became crowded, for a young, inexperienced queen who could not even lay eggs, could not head a new settlement. Immediately a great number decided to go with her, and began to pack up. "Packing up" for becs is breaking into honey jars and gorging themselves.

It was a warm, sunny day in June. Led by the old queen, thousands of bees boiled out of the hive and gathered on a low bush or branch—a regular congress of bees. Very likely they got together to talk things over. Suddenly a cloud of smoke stunned them, and they dropped into an empty hive held under them by the bee keeper.

Such a roomy, brand new palace as they woke up in! They explored every corner of it. Some began to carry out dust, vigorously cleaning house. Others flew away and came

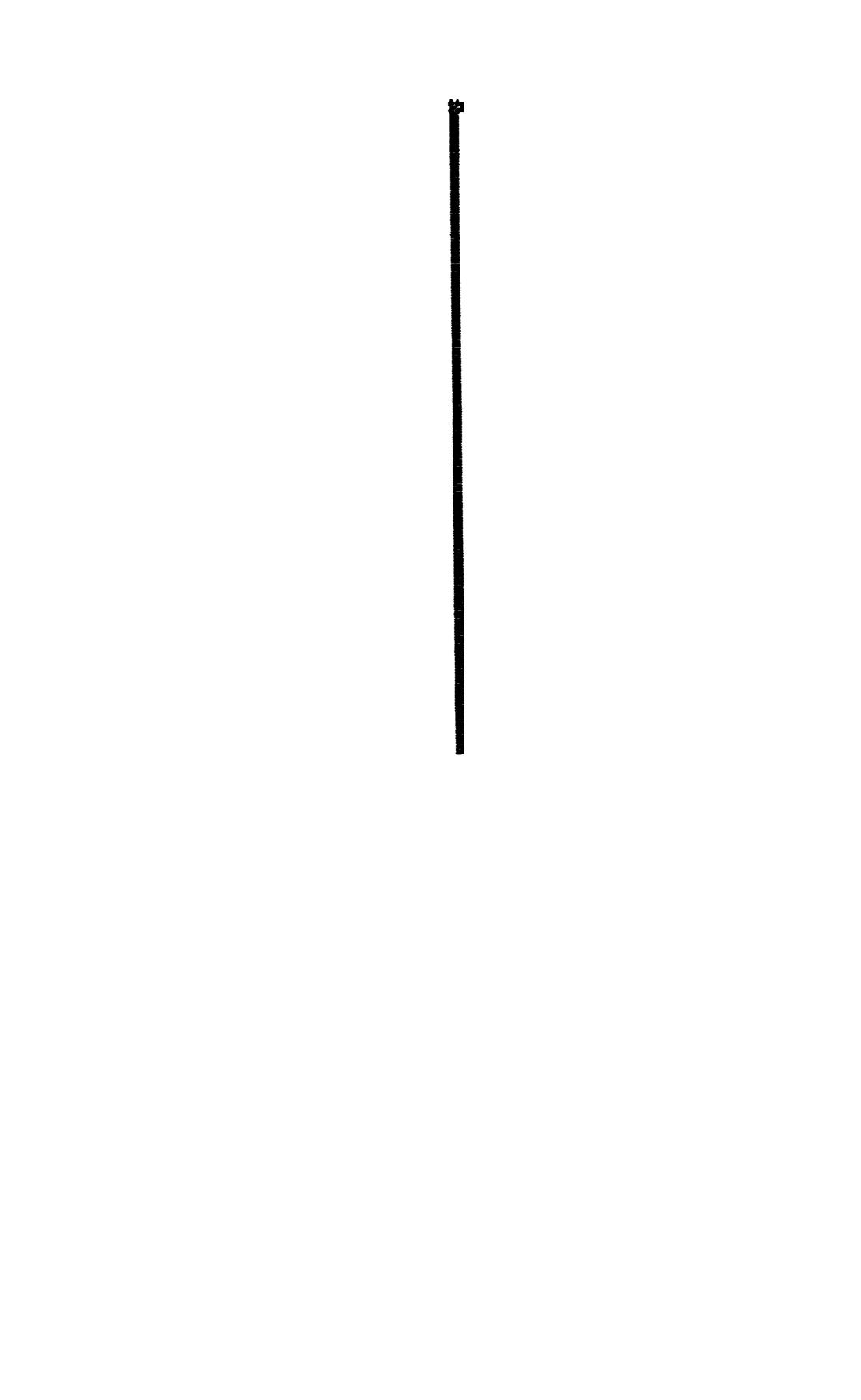


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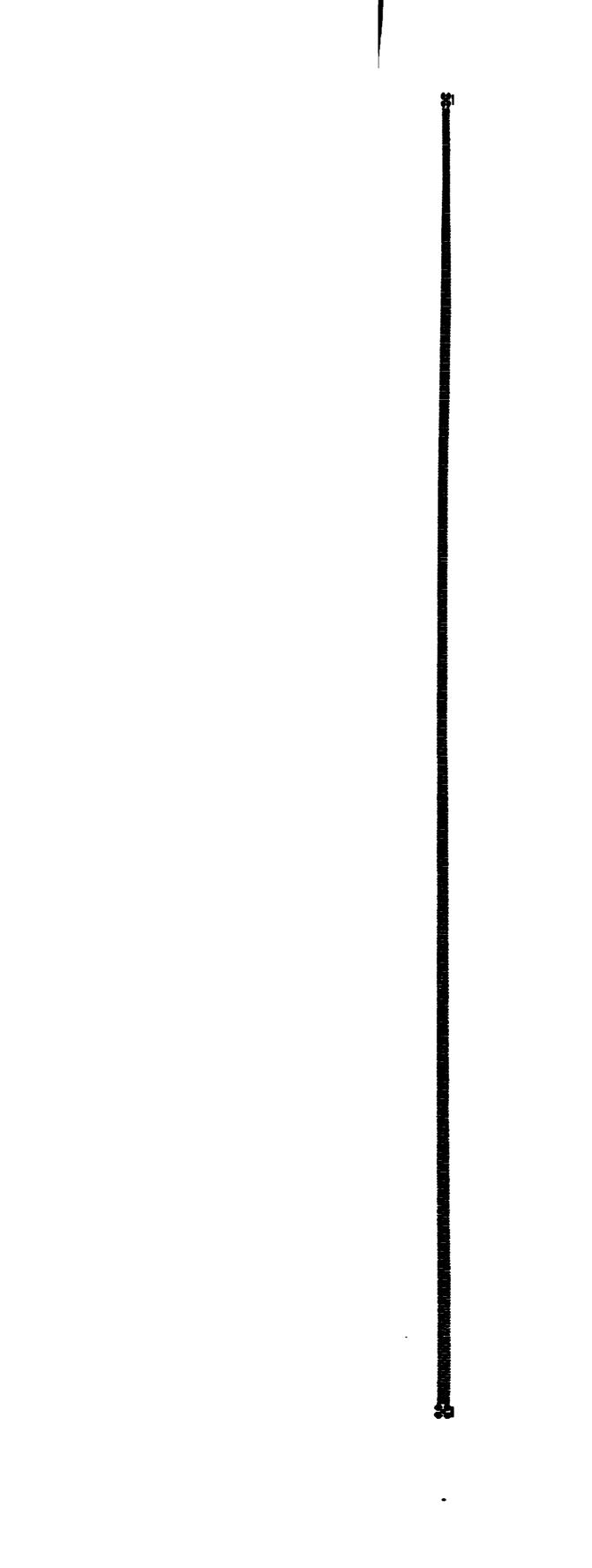
Bee

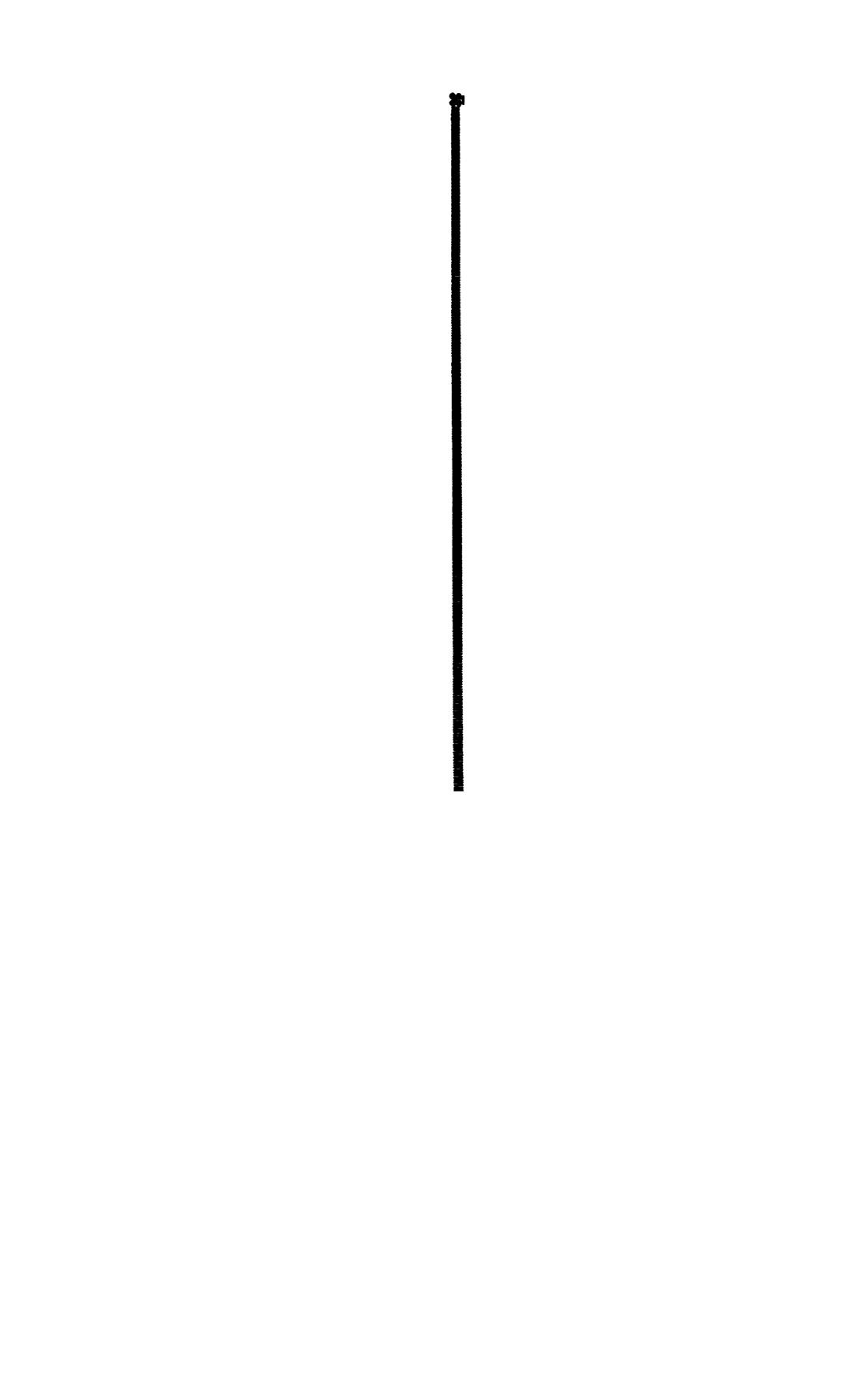
way of of her hollow ct the th her fettis all the bee

rom 1 ey ha ds. 1 racks nside right a clu nless ax oc the ri ' drop hese 1 Each edge a coc mixe ard 1 iass. d a fc la co 1 all c



# THE BUSY HONEY BEE The Baby Bees and Their N





themselves, even affectionate. In passing each other they touched their antennae. With these delicate feelers they caressed the queen and the baby bees. But if a stranger entered the hive—a hornet or strangers Are wasp, or bee moth to lay lits eggs, or robber bees to steal their honey—the worker bees fought the intruder. A strange

around the caterpillar's head in a collar, so all it has to do is to twist and eat all around itself.

If no old queen is in the hive, the young queen is freed at once. How she is watched and fed and petted! In a couple of weeks she goes for an airing. She flutters about her home so she will know it when she returns, for she must take one journey. She

The 'Death's Head' Burglar and the Bees

Do you see how the Death's Head moth got his name? He's a burglar, too! If the bees aren't on guard, he comes into the hives and feasts on the bees' store of honey. You say, "Why doesn't the bee use that terrible stinger on him?" That's the strange part of it. The Death's Head moth makes a squesking noise like the bee queen and, while I suppose it puzzles the bees a good deal that a queen should look so much like a moth, they don't attack him. But I'll tell you what they do do. When they know there is one of these night prowling robbers in the neighborhood, they build walls of wax from the entrance into the hives so small that bees can come in and out, but the moth can't. That fixes him!

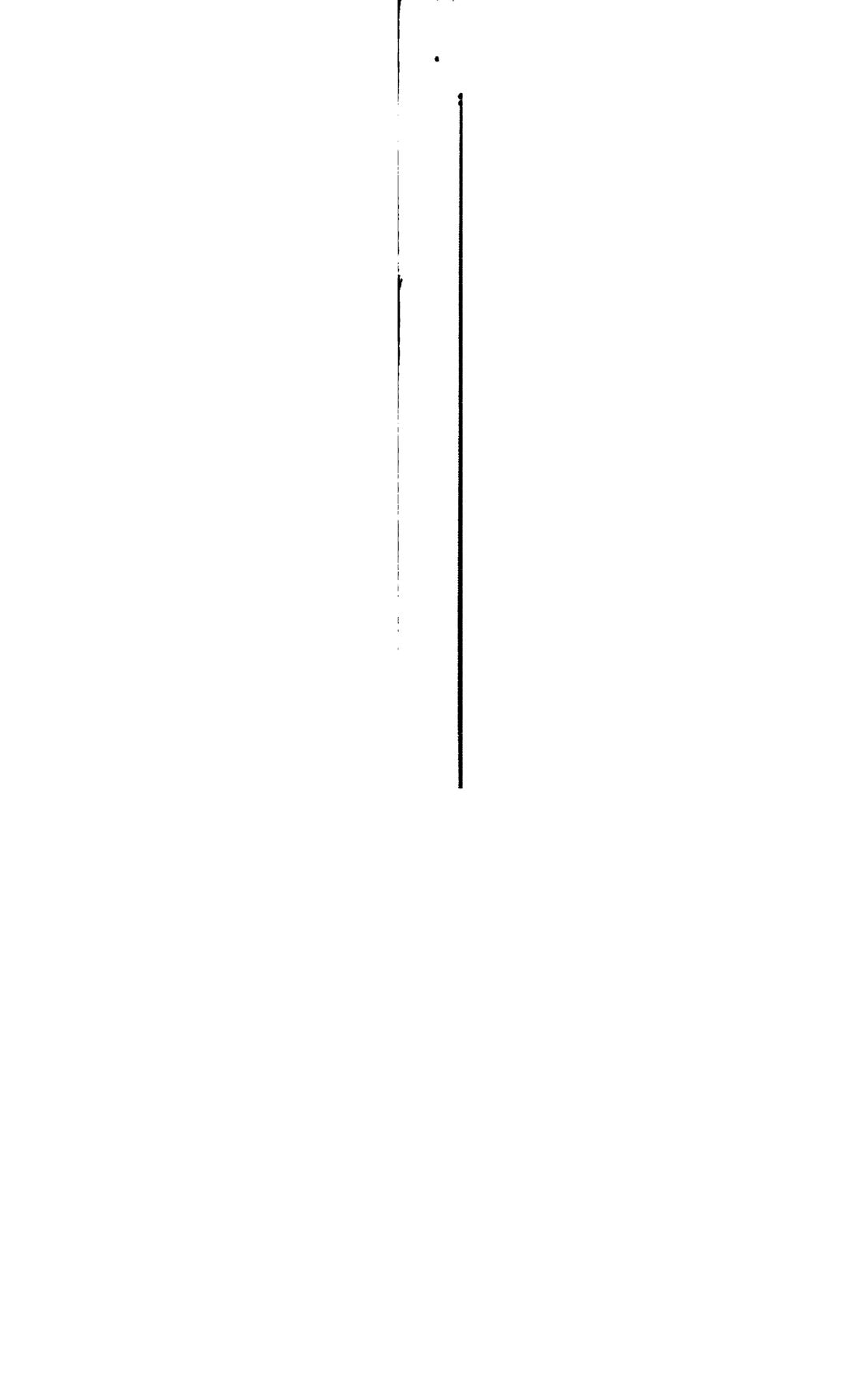
queen was killed by the queen of the hive, or a crowd of worker bees formed a ball around her and smothered her to death.

The queen bee lives three, four, or five years. Sometimes when old he leaves the hive and wanders away to die. Then if a young queen has not been provided, Sorrew the bees are distracted. When Queen Dies For a day or two they go about frantically looking for their At last they return, select a newly hatched worker grub, tear lown partitions to make a larger ell for it, and then feed the grub on oyal jelly. This food is not as weet as ordinary bee-bread. It has acid in it, and it makes the grub zrow fast and big. Food is put all goes straight up, out of sight.

The worker bees wait for her anxiously. She may be captured by a bird, lose her way, or make a mistake and try to get into the wrong hive. When, at last, she drops, exhausted, she is hurried in, fed, waited on, caressed. In a few days she begins to lay eggs—hundreds of them, a thousand or two in a day in the honey season. The hive is a humming city of busy workers.

#### What the Boos Do in Winter Time

Late in summer, when the honey flowers are gone and bees are obliged to get what food they can from decaying fruits, the workers kill the drones. They kill all the drone grubs and eggs, so there will Section 1 TO CONTRACT OF THE PARTY OF THE N. CO. FO 



## "That Silvery-Green, Moon-Spotted Ballroom Belle"

This is one of the most beautiful of American moths. It files at night and is called the luna (which means moon) moth. It lives in the woods on hickory, sassafras and sweet-gum trees. The long, slender, curved tails of the wings and the straight line at the front give the moth an unusual and graceful shape, but its coloring is its greatest charm. Like a little girl's party dress, it is tinted with the daintiest of shades. A background of pale green shades off to yellow on the edges except in front, where the wings are bordered with purple. Transparent circles, like lace medallions, are rimmed with yellow, pale blue and black. Add to this the delicately branched antennae, like slender, young form fronds, and you have a creature as fair as Luna, the moon goddess, for whom it is named.

"coppers" that glitter like metals. You can catch them only with a butterfly net for, like the spider and the fly, they have compound eyes, and can see all around them.

Moths have well's eyes, that tand out from he sides of the lead like jetty hoe buttons. No loubt they can

## Some Strange and Beautiful Wing Markings

This is the "old lady moth." When her wings are closed, as in the picture, she looks like a little old lady in an old-fashioned, fringed Paisley shaw! in dull, quiet colors.

see, in the dark, the rose and gold bandings, and pretty crescent and moon spots on each other. There are only a few hundred varieties of butterflies, but several thousand moths, so there must be many more moths abroad at night than there are butterflies by day. A great many are

## Face to Face with Mrs. Moth

"The head is a flattened globe, broader than it is long. The bright, compound eyes are on the sides, and between them the feelers that are fingers, noses and maybe ears. The brain is mostly a pair of optic, or eye nerves. No wonder a butterfly is hard to catch!"

attracted by bright light, and fly around street lamps. But the fine, large ones seldom come near houses. The big hawk moths visit the evening primrose for sips of nectar. You can coax moths out of trees and bushes by smearing tree trunks with molasses and alcohol. That will make them too stupid to move when you flash a dark lantern on them. Then you may see the polyphemus of the velvet brocade gown; or that silvery green, moon-spotted ball room belle, the luna moth.

## Raising Moths and Butterflies

But these fluttering little creatures won't stand still long enough to be

As Beautiful as Birds' Eggs

of leaves, and on the stems of any plant where many butterflies or moths are flying about, you can find little chalky dots of eggs, Look for the often smaller than pinheads. Some are alone, but others are laid in strings or clusters. Break off the branch on which they have been laid, for the

At the "Homely Age"

"Although a caterpillar is long and squirmy it is not a worm. It is a larva or imperfect insect. Its body is nearly always in thirteen ring sections. The head is largest. The next three sections have three pairs of feet. The last nine sections are all stomach. Under the rear end are supports, or false feet. Most enterpillars are smooth, with thin skin lying in wrinkled folds, but many have borns."

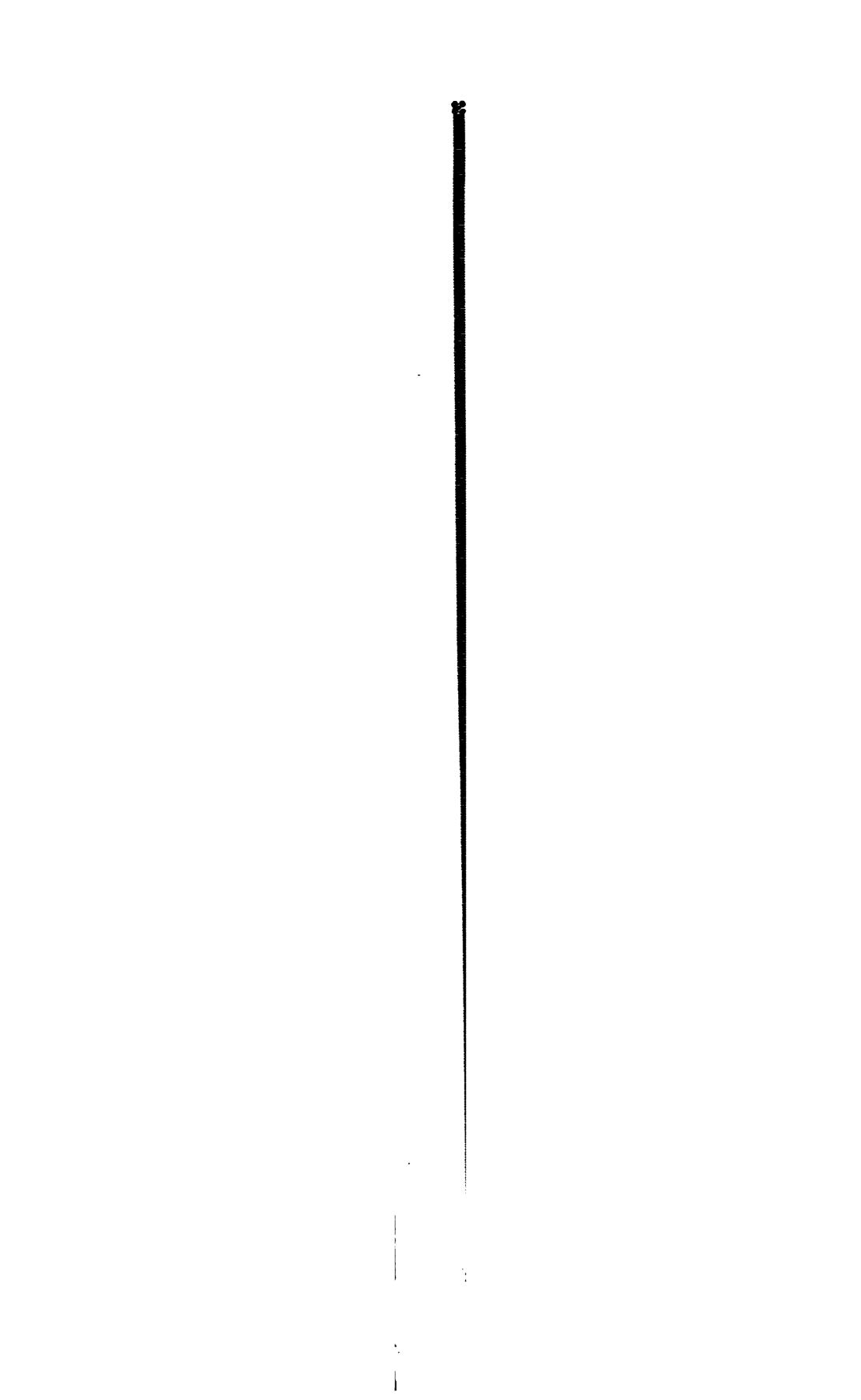
leaves will be the proper food for the caterpillar. Put the branch in a jar of water, through a hole in a paper cap, or the squirmy babies may be drowned.

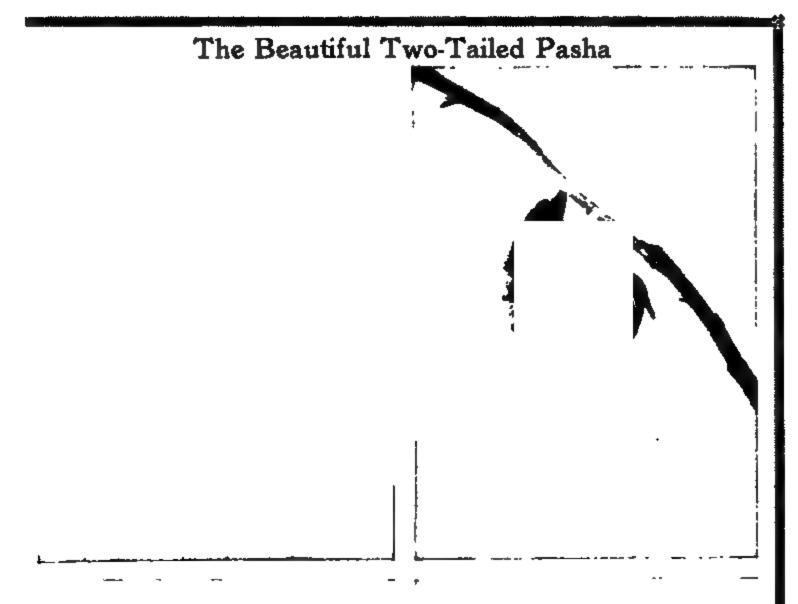
Under a microscope you would find butterfly and moth eggs as prettily colored and marked as bird's eggs, but of many odd shapes. They are globes, cylinders, cheeses, barrels, turbans and pancakes; and some are sharp cornered, ribbed and spiny. Each one has a papery shell, and is filled with a live speck floating in a bath of liquid food, as a chick floats in a hen's egg. That speck grows and soaks up food and wiggles, and finally pushes, or cuts open, a thin door at one end, and

"Under a microscope you would find butterfly and moth eggs as prettily colored and marked as birds' eggs, but of many odd shapes. Some are sharp cornered, ribbed and spiny. Each has a papery shell."

studied. Why not raise a few! In the story of Silk you can read about how Chinese and Japanese children watch the silk moth eggs hatch, feed the larvae on mulberry leaves, watch them spin their silk cocoons and, in a few days, crawl out as pretty white moths, to lay eggs again.

On the tips, edges and undersides





Here are tour stages in the life history of the butterfly called the two-tailed pashs. The caterpillar in the upper lefthand picture is colored the same rich green as the arbutus leaves upon which it feeds. You can see how this protects it from its enemies. It rests all day on a lesf, as you see it here, and becomes active only at night. Next you see it hanging to a stem by its tail hooks with its head curved upward "like a fat letter J." It is all ready to change to the chrysalis shown at the left below. Pinally, you see the full grown butterfly clinging to the chrysalis skin from which it has just come.

The Pasha's Wings

shoulders. Many butterfly pupa cases have gold and silver spots, so they are called chrysalides.

Moths weave silk cocoons, or make plain black or brown oval pupa cases more like the beetles. To do this they often bore into the earth. So, if your caterpillars refuse to climb, give them a box of earth to burrow into. butterfly spins such a silken cocoon as does the larva of the silk moth, nor does it weave a nest for itself of wool or fur fibers, as do the larvae of the carpet and fur moths.

You can find chrysalides, COcoons and horny pupa cases,

vherever there are trees, shrubs, rines, weeds and old fences and louse walls. Any school can make a ine collection in the spring. ast brood of insects of every year Inder the sleep over winter like led clothes bears. The silk moth, Minter and some others, live ver in the unhatched egg, but most utterflies and moths live in their upa state, sealed up in water-tight, orny shells or gummy silk cocoons.

When in the pupa state a miracle

takes place. The great stomach shrinks. The biting mouth changes to sucking tubes. knobby legs stretch and get joints and claws. Webby wings sprout on the sides. The eves are faceted like diamonds. Put your glass box of chrysalides and cocoons in the sun. Some bright morning you will see one of those prize packages crack open and an insect creep out, feeble and crumpled, the wings moist and baggy. You can watch it unfold and open like a flower.

You c a n p h otograph, draw and color the butterflies and moths while

they are getting ready to fly, but do not touch them, or you will rub away the beautiful, dust-like scales that cover the wings If you find a dead butterfly, sometime, you could remove the scales and Anatomy of the Butterfly study the wonderful framework of the deli-Every little tube is cate wings. double. The inner tube is hollow, and filled with air, like the bones of a bird. Outside of this is another tube filled with blood. A thin

### THE BUTTERFLIES AND THE MOTHS

## The Beauties of a Butterfly's Wings

The Scales on the Wings

Some Strange and Be Markings

In tropical countries but very frequently marked with highly colored spots. Ther for this. One is that the the attention of the butters wings instead of to its head terflies are sometimes found tured near these apots, whilly injure them. The gaudy wings really protect the ubuttersly's body, you see. A be that the curious spots for the more timid enemies

"Do not touch them (butterflies) or you will rub tway the beautiful, dust-like scales that cover he wings." Here you can see how the scales ook under the microscope. Some are really colored, others are tiny prisms, breaking up and reflecting the light so that the butterfly's wing teems to have all the beautiful rainbow hues.

Notice this curious moth holes in her wings. The wsolutely transparent in thes read print through it.

net is stretched over the frame, on both sides; and that is shingled with leathery scales that overlap like fish cales. These are colored, and arranged in borders, spots, and various reautiful markings, as if painted, or mameled.

The body of the butterfly, or moth, s in three parts, as your body ishe head, thorax or chest, and the The head is a flattened clobe, broader than it is long. The right, compound eyes are on the ides, and between them the "feelers" that are fingers, noses, and, maybe, ears. utterfly's ump Mouth The mouth is just two ittle sucking tubes. If you put a trop of syrup on a leaf you can see he little creature suck it up, as a ubber bulb syringe sucks up water. ndeed it is just like that. The liqid food is pumped up into a holow place in the head. From there : is emptied back into the stomach.

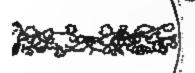
A species of South As has a plainly marked figure side of each hind wing. I you one.

The brain is mostly a or eye nerves. No wo fly is hard to catch!

All six of the legs three-ringed thorax, the caterpillar, and fastened to this smal too. The abdomen part. It needs to be female insect, to m many eggs.

Watch the insect li jointed legs. It will





## IN THE GREAT **WORLD OF NATURE**

ANTS 

## Clever People in Buried Cities

"Good Morning"

N THIS big world of ours there are strange cities that have thousands of inhabitants. The grown people in them are as busy as can be. Some are always building, repairing, and keeping the city clean. Some go outside to gather supplies, or act as soldiers to guard the city from enemies. Others take beautiful care of the chil-They dren. wash, dress and

Miss Aut is standing in the door of her apartment in the early morning sunshine, washing her face. She knows as well as you do that that is the proper way to begin every day, and what's more, she never has to be told to do it! feed them, change them about to the warmest houses and take them

out for airings in the sun. There are queen mothers in Good Aunts those cities, who are Among the attended by maids of honor, but they do not give or-Everyone understands his duty and does it without being told. It is thought that every citizen knows how to do all kinds of necessary work, and rests by changing work with others. Each one toils cheerfully, not for himself alone, but for the common good. So, in those cities, everyone has what he needs. and no one is either rich or Everypoor. one is peaceable, and there is no quarreling or disorder.

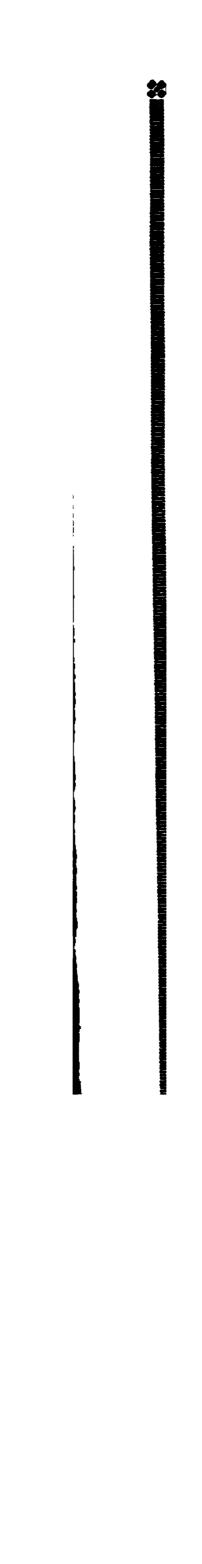
Now, if some traveler were to come home, from a faraway country that no one had ever visited before, with such a tale as that to tell, wouldn't you be interested! You might even plan to go to see those cit-

ies when you were grown up. You would think that a great deal could be learned from people so industrious, unselfish, wise and good-tempered.

## Did You Ever Visit an Ant City?

But you won't have to wait to grow up, nor take a long journey to visit one of these wonderful You can find such a city on any grassy or sandy bank, around the roots of trees and stumps, and even above cracks between the bricks and stones of





There it is cut into bits that can be taken through the tiny tunnels into the nest.

You notice some ants coming out of the nest are not carrying anything. They hurry away on various to make rooms and galleries, and other waste. They are as clean little housekeepers as bees. things they take some distance from the nest and drop. But when they bring up little white oblongs that

Three Guests in the Ant Household

Although ants will often attack a strange ant coming among them, they are hospitable to other kinds of insects. They allow them to live in their nests and eat from the common supply of food. The insect shown on the left is the springtail, a guest in the ant household. In the middle is one of the aphides—a white wood louse which supplies the ants with a syrupy liquid when "milked." The third picture shows a bestle which is often found in the ants' home. Possibly the ants reason

this way:

"By welcoming the aphides, which are no kin to us, look what a fine lot of cows we got. Who knows what other strangers may bring us?"

Who knows, indeed! Such wise little heads, these ant heads. No wonder the wisest of men learned wisdom from the ants. (See Proverbs 6:6.)

errands, along certain paths, or main traveled roads. It is thought that they follow each other along these paths by the sense of smell. If you put an ant off one of these paths, some distance from home, it is puzzled and runs around at Why Ante If you even random. Like Dogs draw your finger across a path the ants seem to lose the scent, as hunting dogs do at running water. Ants have been seen to run up and down a finger mark, go around the end of it and pick up the scent on the other side. But if you put a pebble on the path they are apt to climb over it, instead of going around it.

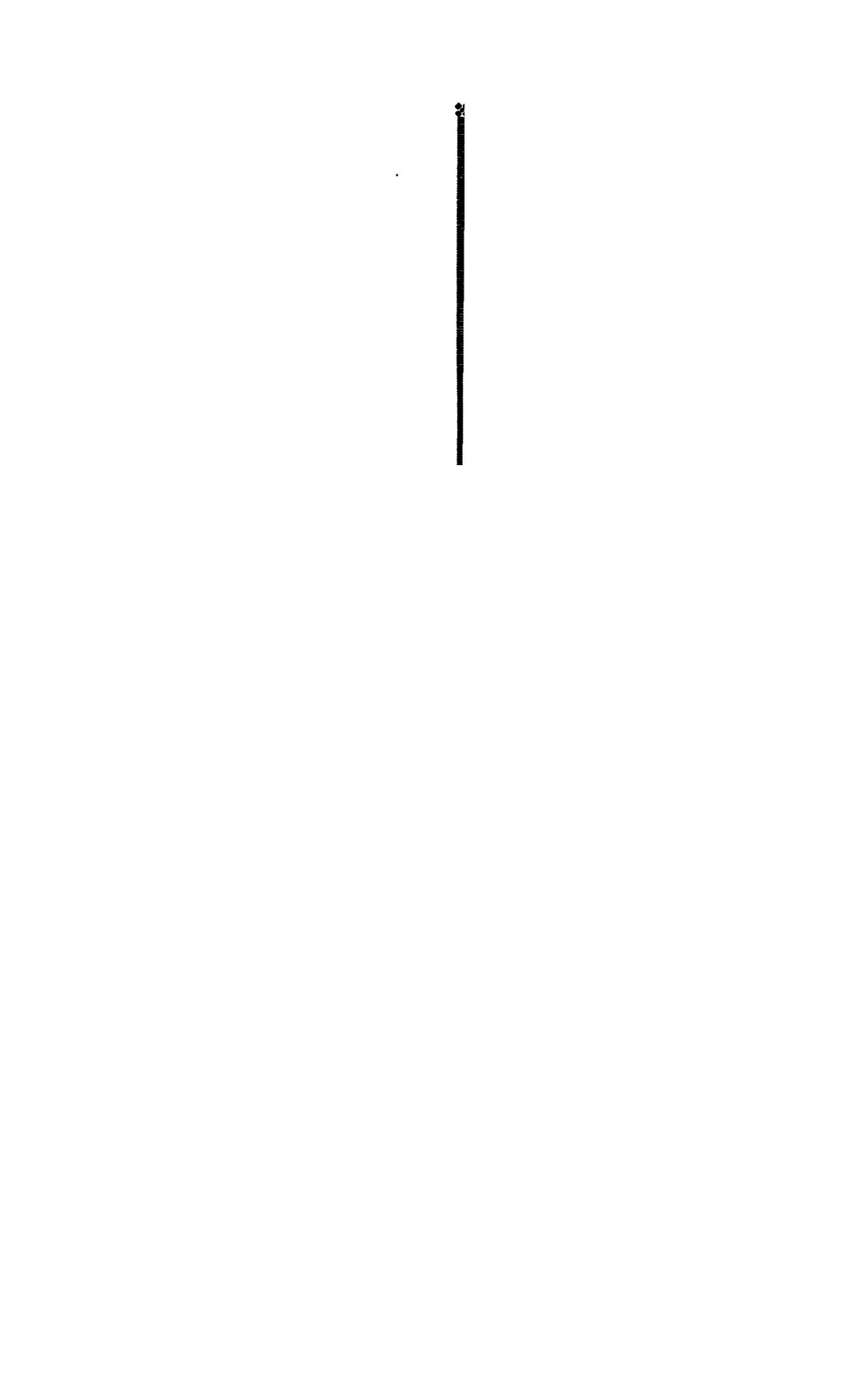
### How Neat Our Little Ant le!

Some ants, in coming from a nest, oring up earth that has been dug out

look like grains of barley, they lay their burdens carefully on the hill top and stand guard over them.

Those are ant babies out for an airing. They are not perfect insects, Barley Grains? but grubs, wrapped up in pretty silk cocoons, as Baby Ante pretty and soft as the silk moth's cocoon, but, oh, so tiny! The sun warms these babies, and helps them get ready to break out of their cradles. If a cloud appears, chilling the air, the nurse ants hurry the babies indoors.

Then is the time that you would like to lift the roof to see what is going on. If the homes of our pavement ants are like those "A House of Many of other burrowing members of the family, there is a shaft or up and down tunnel, several inches deep. At different.



₩ m

#### WISDOM OF THE ANTS

nd gone to sleep,
and all" are
n, every sunny

into the World annot get out of selves, but must and drones that to start new hatched out in boil out like bupward. The many of the come to earth a

w the Ants Take Their Cowe to Pastu

Many aphides live on roots underground. These "cows" are liked so gather their eggs and guard them in the nest during the winter. Here some of the young aphides to the roots which are their food. The young eggs in the ants' nests. Some aphides salute their ant hosts when they kick of their hind legs. A species of yellow ants lives altogether on swi aphid cows.

be helped out. The nurse ants open the silk case, draw the infant out, straighten its legs and stand it up, feed it from their mouths, and, if it has any, smooth its crumped wings. Sometimes they help a baby out too soon, and have to work over it for an hour or more to save its life.

You never saw a winged ant?

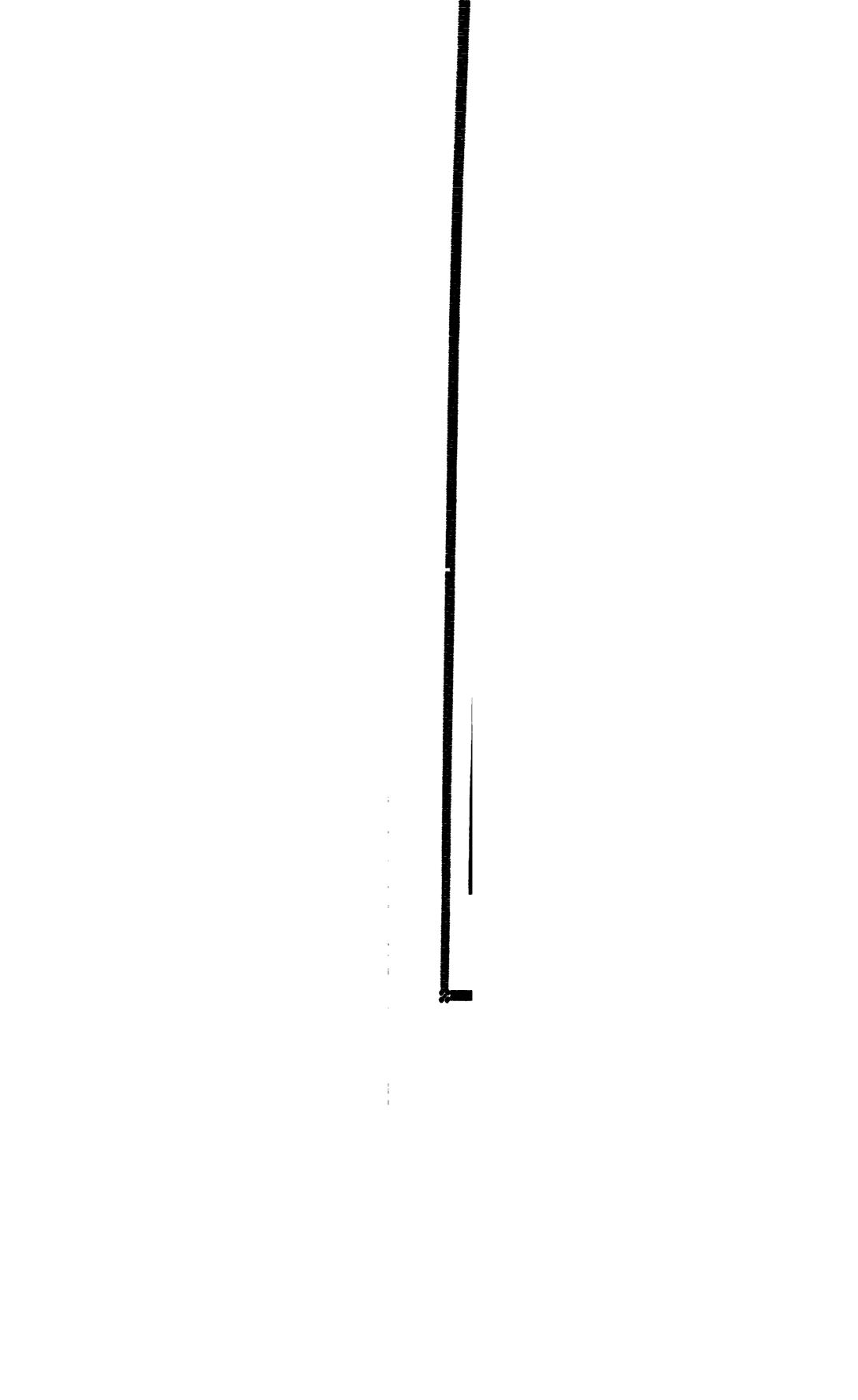
Some day in the early a Winged fall you may see a Ant?

swarm of winged ants leaving an ant hill, if you watch one.

The winged ones are young queens

to their old nest captured by ant queen. If not start new coloni How the Ant Que

The queen waings again, and to be very in-secaptors pull the sensibly rubs the against rough queen starting a some time for queeness n



## WISDOM OF THE ANT

sociable ant to endure. She has to dig a nest, and bring up the first small brood herself. But after that the queen mother has a life of ease and honor. She never Ante Are Kinder leaves the nest again, Than Bees and is not driven out, when old, as a queen bee is. She lives longer, too, sometimes six or seven years. Worker ants, too, live over several winters. Worker bees live only six weeks or so, a few of the last brood living over winter.

## But Ants Aren't So Thrifty as Bees

That is odd, for ants do not store food as bees do, for winter use. Most of them live from hand to mouth, gathering every day only what is

needed at th make wax o ants have one body is used ers to put s fa Farming A mong the Ante 84 supply. The eat decay qu could not be ants seem to to be able to eating. On v in winter the stretch their l

> Milking There is on

Ante as Engineers

#### Lives that Teach Great Lessons

#### To the Readers of Pictured Knowledge:

#### THE WORLD'S HELPERS.

In the history of every nation there are a few great names that, "like peaks of sunken continents rise from oblivion's sea." The thoughts and acts of these men and women determine the course of history. They give color to their nation's record, the builders of its reputation. It is these we have in mind when we consider a nation's virtues. When we think of the Greek as a lover of philosophy, harmony, and beauty, we do not mean that every Greek partook of the genius of Euripides or Phidias or Plato, but that there were such among the Greeks, fine strains of human heredity more precious than any other possession of the nation. slaves, the foreigners, the men on the street were not touched with "the Glory that was Greece." Nor did this glory endure, when suicidal wars had put an end to the whole race of Hellenes that originally sprang from Mycenae. Similarly the Egyptians named the stars, built the pyramids and did many wonderful things. this was the work of the chosen few. The average pariah of the Nile never named a star, nor accomplished any other feat termed Egyptian. The Romans were the world's law-givers, but not many of them had any concern in Equity. And if freedom was born in England, there have been many thousands subservient and complaisant Englishmen for every Pym, Hampden, Cromwell, Cobden, Bright or Bryce.

These fine strains occur in every human stock. They give our races their character. They give our institutions stability. They are the "men who command while the world obeys." They are the men and woman who can see what commands are possible and what are the needs of the world. He who strikes as the gods strike has the force of infinity in his blows. He who defies them wields a club of air.

And this aristocracy of mind and morals are not the world's nominal rulers. To rule by force is the cheapest, crudest and most unworthy form of domination. The truly great of the earth are the World's "Helpers." It is the noblest attribute of democracy that it gives these their opportunity. Democracy asks, not for rulers but for helpers, and it asks of these no credentials of aristocratic birth or breeding, but only this, - Can they help?







# The Neighbor Lady of Hull House

that she saw in the poor quarters of the pretty city of Cedarville, Illinois, where she was born in 1860. You see, she could not play like strong children, so she read and thought a great deal, and talked with her bighearted father. One day she found him looking sorry over something in a newspaper.

#### Her First Knowledge of a World Friend

"Joseph Mazzini, the Italian patriot, is dead," he explained. Twelve-year-old Jane did not understand.

"Why should you feel bad? You didn't know him."

"No. But all lovers of liberty mourn his death. He was a brother to all mankind, helping not Italians alone, but many peoples he had never seen, to win Why the freedom." That was an-World Mourns Men other thing Jane never It helped her to think out how she could help the thousands of emigrants who come to make new homes with us, to be Americans. So poor, so puzzled, so friendless in a strange land, we let them come, but do nothing for them. 'They drop into the big "melting pot of the nations," as our country has been called, and we expect them to become Americans without help. To get her big house among their "horrid little ones" and be neighbors, would be, she thought, a kind and useful thing to do.

But first she had to go to college and travel abroad. She was twentynine, a strong woman with a nearly straight back, when she and her The Beginschool friend, Miss Ellen Starr, went to live in Hull House, a fine old mansion in the most crowded foreign district of Chicago. She built a

bright fire in the hall of her lovely American home, and invited her prosperous Irish and German neighbor women in for a cup of tea. She got them to help her give a party to the Italians. And when they saw what beautiful manners the Italians had, how they could sing and dance and talk of the art photographs on the walls, they stopped calling them "dagoes." That was the beginning of neighborliness. The Greeks were invited, the Russian Jews, the Boheand the other nineteen tongues of the Chicago's nineteenth ward.

Soon there was a reading room at Hull House and evening classes in English; an art gallery and studio; men's, boys', girls' and mothers' clubs; a gymnasium and What They Do at shower bath; a day nurs-Hull House ery, kindergarten, and pure milk depot; a coffee room and restaurant; a dancing and lecture hall, and a stage for giving little plays. Other buildings were put up, among them a model tenement. Hull House sheltered a colony of earnest people, and the rich offered both money and services.

First, Miss Addams fought loneliness-she made Hull House a center of social life. Then she fought dirt, ignorance, sickness, bad working conditions, and bad hous-Neighborliness and Good ing. She got herself ap-Citizenship pointed garbage inspector. At five o'clock in the morning she was up watching the wagons. There was a clean-up day, the children collecting paper and tin cans, the women sweeping alleys and streets and clearing the fire escapes. Then she got a Juvenile court; and new child labor, factory, and tenement house laws. With forty people sometimes working and living

#### THE NEIGHBOR LADY OF HULL HOUSE

with her, Miss Addams stood in the center of things. Such beautiful manners she had — always the same for the "Colonel's lady and Judy O'Grady," the poor scrub woman, the push cart man, or the troublesome child. In ten years she was called "the first citizen of Chicago." She served on the school board, was elected president

of the National Board of Charities, and was honored with degrees by several universities. Those who knew her best lovingly called her The Irish "Saint Jane." An Irish Woman's woman neighbor of hers Tribute has said:

"If there be anny that will have respict in their buryins it's our Saint Jane."

### Who Is My Neighbor?

Thy Neighbor? It is he whom thou Hast power to aid and bless; Whose aching heart or burning brow Thy soothing hand may press.

Thy neighbor? 'Tis the fainting poor,
Whose eye with want is dim,
Whom hunger sends from door to door;
Go thou and succor him.

Thy neighbor? 'Tis that weary man, Whose years are at the brim, Bent low with sickness, care and pain; Go thou and comfort him.

Thy neighbor? 'Tis the heart bereft
Of every earthly gem,
Widow and orphans helpless left;
Go thou and shelter them.

Where'er thou meet'st a human form Less favored than thine own, Remember, 'tis thy neighbor worm, Thy brother, or thy son.

Oh! pass not, pass not heedless by;
Perhaps thou canst redeem
The breaking heart from misery—
Go share thy lot with him.
Anonymous



## Col. George Washington Goethals

"The Boss of the Job"

These little pictures show both sides of the medal given by the Geographic Society of Chicago to Col. Goethals at a banquet tendered to him on the date shows. The figure of the Phoenix rises from the flames, on her breast the motto, "I Will." Her own history is a striking example of what can be accomplished by energy and determination, it is very fitting that she should recognize in this way the work of the great engineer who joined the oceans. On the obverse side of the medal (shown on the right) is the shield of the city, and on either side the land masses of the two hemispheres. The heads of wheat and the cars of corn stand for the products of the great Mississippi Valley, so greatly benefited by the new water route. On the other side are the laurels Col. Goethals has won.

Goethals,

HAT is the "See Colonel Colonel Goethals, chorus of a It's the only right and proper nations, popular song thing to do. sung in the Canal Zone while Just write a letter, or even better coming and gothe Big Ditch view." was being dug. To understand the fun and sober truth in that song you would have had to live under the strict but kindly rule of the Chief of the Panama Canal Commission.

At first our Congress provided only for the work being done, but nothing much could be done until order, safety, The Little World at health and contentthe Isthmus ment of workers were provided for. There were thousands of men and their families of many grades and nationalities -American engineers, chemists, electricians, machinists, teachers, nurses; Spanish Americans and Indians; Jamaican negroes; East

tell Indian coolies. Sailors all traders and tourists were Arrange a little Sunday inter- ing. There were two seaport ci-

ties, many native villages, work camps, schools, hospitals, government stores, a railroad and millions of dollars' worth of machinery and construction material. And there was no government, as we understood it, no citizens, no elections, no courts. "boss" was what was needed. It was President Roosevelt who decided to put the work into the hands of Army Officers. They were used to giving and obeying orders. A board of seven commissioners was appointed with Colonel Goethals as commander in chief. This Canal Zone became a military camp.



negro demanded the money his wife had earned over the wash tub. He listening, deciding, sending most was a British subject he said, and

that was the Eng-

lish law.

"You get American law in the Zone. The money is hers," Colonel Goethals said. He ordered damage claim papers made out for a man hurt at his work. He refused to reinstate a gang boss who bullied his men. The man cried out angrily that he would appeal the case.

"To whom!" said the Colonel,

smiling.

"But Τ'n American citizen. I have rights."

"The only right you have here is to go home, if

you don't like it. There's a steamer three times a week."

Until noon he sat on his veranda. people away satisfied with having

Col. G. W. Goethale, D. S.

"told the Colonel." Week after week and year after year, he staved "on the iob." He never had a vacation. He never talked about himself. Before a committee of Congress he summed up thirty years' army service in one hundred sixty - seven words. Under his rule in Panama there was no disorder, no waste, no stealing from Uncle Sam. He was not popular in the same sense as was Colonel Gorgas, the jolly health commissioner: but every-

Columbia University gave Colonel Goethals the honorary degree of Doctor of Science, in recognition of his great work in Panama. This is how he looked as he was being congratulated.

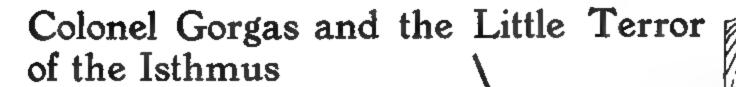
one trusted him, and admired him

for his clean, honest, effective work.





## SOME OF THE WORLD'S HELPERS



How Science and Diplomacy Defeated the Deadly Mosquito With Its Poison Bearing Darts

nodel of nonquito an Mural His-rk City. : insect e it assoing its k. The nuilt insect g like a siler.



HELLO Central! Give me the Sanitary Commission. Hello! Is this the Health Office! There's a mean, blood-thirsty mosquito in my house. Send an officer, please."

#### Where Policemen Arrest Mosquitoes

Such nonsense! Is it meant for a joke! No. It is an every-day happening, along the Panama Canal, to call a health officer to arrest a mosquito burglar. There are terrible beasts and snakes in the hot, green jungle, but no wild animal in tropical

America is as dangerous as the mosquito. It may give malarial or yellow fever to anyone it bites, Mosquitose and then, by biting the Worse Than sick, spread these dispunghe Beasts eases to well people. After a full meal of blood the mosquito hides, high on the wall, in a dark corner or closet or hanging garment, and goes to sleep. If one is in a house health officers find it.

#### In the Pest Hole of the Americas

In 1900 Panama was, as it had always been, the worst pest hole of the Americas. For nine

#### PICTURED KNOWLEDGE .

rains there ties of mosties of mosties of mosties of mosties ps and slow, as. Doctors ases are givisances. If here and dig s had to go. t Colonel ter and surimily doctor

rules. They c why the "wigg water barrels closets did any see no use in cl Just to Oblige ing the Colonel Col jolly and fries thing he asked They let him tem and sewer in the villages, seemed a queer

#### . Y. F. Mos-

#### Then Came M

Is of people s, Spanishhinese coove these feabout health That settled Mosquito, but quito laid he All along the had to be drai

In the Panama Jungle

d snake e mosquie picturiles." Ting one pround s

the hills, across every rivulet that flowed to the villages, iron ash cans were set on plank bridges. The cans were filled with crude carbolic acid, resin and caustic soda. This oily poison oozed, drop Million Dolby drop, into all the lar War on Wiggletails streams and spread over the water. When the mosquito wiggletails came up to breathe they were killed. Negro porters, carrying tanks, sprayed the poison into every pool. Doors and windows were screened with copper wire. A person sick of fever was rushed to a hospital. Health officers vaccinated Others trapped, poisoned people. and shot wharf rats at the seaports, for rat fleas carry the black plague. It has cost millions of dollars to make this hot, damp country as healthy as a northern city. It will cost more millions, every year, to keep it so healthy that ships will not carry diseases elsewhere.

#### The New 'Bill of Health' for the Zone

What do you think the health officers call themselves? "Ditch dig-Colonel Gorgas says that, gers." by keeping the workman in good Sanitary health. the Result of Commission took the Doctor's half Great Work the dirt out of the Cule-Through his good work bra Cut. he keeps families together, mothers and babies on the green, palm-shaded lawns, a swarm of rosy children

tumbling boisterously in and out of white school houses. He says he intends to make the Canal Zone so healthy, that a man will have to break a leg to get into a hospital.

No other work done on the Canal has been more important or diffially a cult; no other has affected so many far-away lands and peoples. In countless places Colonel Gorgas' methods of fighting germ diseases and insect carriers are being copied. And how sweet and human he is. Do you want a picture of him?

#### A Pen Picture of the Soldier Doctor

He is a strongly built man, with a kindly smile and twinkling eyes. He wears white duck, a soft shirt and Panama hat. In any native house he may be seen, with fat, scrambling over brown children He slaps the men him. But the Jolly and boys on the should-Doctor Means It! To the lady he says: er. "Senora (Madam) you certainly do make the best lemonade on the Isth-I just turned your rainwater barrel upside down." Then to the husband:

"Senor, if you don't fill up that puddle in your back yard, I shall have to put a fine fellow in jail. How many toes has baby Rosalie got? Five! That's just the right number to play a game I know:

"This little pig goes to market"

# The Man Who Taught the World That "No Boy Can Be a Criminal"

"Today, hundreds of honest and useful men bless the 'kid' Judge for giving them a new start, and saving them from the disgrace of having been in a reformatory."



# SOME OF THE WORLD'S HELPERS



# The "Kid" Judge

Judge, but a judge of children. It is the slang nickname that the boys of Denver gave to Judge Lindsey. It is an affectionate pet name, too, for they love him. He would not trade that name for the proudest title in the world. This is how he got it.

#### An Appeal to a Boy's Honor

In 1900, when he was thirtyone years old, he was elected judge of the Probate Court in Denver. There was no Juvenile Court then. When a boy Robbery was arrested his case of the Pigeon Roost was tried by any one of several judges. One morning a "gang" of boys were brought before Judge Lindsey, charged with robbing a pigeon roost. That was stealing. The law called it a crime, no matter whether the guilty person was six years old or sixty. The boys hadn't thought of it that way. In taking the pigeons they saw, they were just teasing an old man who was illtempered and mean to boys. Judge Lindsey explained the law. He must send them to the reformatory at Golden.

Then he remembered something. With a crowd of boys he had once started to the Judge raid that same pigeon roost, to "get even" with the cross old farmer. The other boys did do it, but Benny Lindsey backed out because he

was afraid. Those boys had all grown up into good and useful men who would not think of stealing. What if they had been caught and punished as criminals?

"Would I be here now, to judge these boys? No. I would probably have been discouraged and turned bad."

#### Then He Said This to the Boys:

"Boys," he said, "do you know what a parole is? Prisoners of war in camp, where they cannot be locked up, give their word of honor not to escape. I will parole you. You must report to me once a week. If you break your word and get into trouble again, I shall have to send you to the reformatory. I will be criticized for giving you this chance to reform yourselves. If I trust you, and I believe in boys, why, you must stand by me."

He was a small, boyish-looking man, with a big head and frail body, and he talked to the boys as How the Boys though he were one of Stood By them. So they called the Judge him the "kid" Judge, and stood by him, because he understood "kids." So successful was this new idea of getting boys to behave "on honor" that other judges sent all the children to Judge Lindsey.

#### A Live Boy vs. a Dead Man's Millions

One day he interrupted the hearing of a will case to attend to a

night school and worked his way through college. But he always had a home and a good mother. When he became a judge he saw many boys who had neither.

#### Isn't 95% Interest in Boys Pretty Good?

Ninety-five out of every hundred children that he put on honor, never got into trouble again. Boys who just couldn't behave he persuaded to go to the reform school. He gave them money and tickets for the journey and they went alone, without guards, asking to be locked up. Once a week there was a confessional in the court room. Each boy

made his own confession. No boy was ever asked to tell on another. You know how boys despise a Boys Who "snitcher." The "kid" Liked to be judge despises one, too. Locked Up Boys who had not even been arrested came to Judge Lindsey and owned up to law breaking. Stolen things were restored to their owners, and destroyed property paid for through the juvenile court.

Today, hundreds of honest and useful men bless the "kid" Judge for giving them a new start in life, and saving them from the disgrace of having been sent to a reformatory.

### The Barefoot Boy

Blessings on thee, little man, Barefoot boy, with cheek of tan! With thy turned-up pantaloons, And thy merry whistled tunes; With thy red lip, redder still Kissed by strawberries on the hill; With the sunshine on thy face, Through thy torn brim's jaunty grace; From my heart I give thee joy,— I was once a barejoot boy! Prince thou art,—the grown-up man Only is republican. Let the million-dollared ride! Barefoot trudging at his side, Thou hast more than he can buy In the reach of ear and eye, Outward sunshine, inward joy; Blessings on thee, barefoot boy!

Oh, for boyhood's painless play,
Sleep that wakes in laughing day,
Health that mocks the doctor's rules,
Knowledge never learned of schools,
Of the wild bee's morning chase,
Of the wild-flower's time and place,
Flight of fowl and habitude
Of the tenants of the wood;
How the tortoise bears his shell,
How the woodchuck digs his cell,
And the ground-mole sinks his well;
How the robin feeds her young;
How the oriole's nest is hung.

Oh for boyhood's time of June, Crowding years in one brief moon, When all things I heard or saw,

Me, their master, waited for. I was rich in flowers and trees, Humming-birds and honey-bees; For my sport the squirrel played. Plied the snouted mole his spade; For my taste the blackberry cone Purpled over hedge and stone; Laughed the brook for my delight Through the day and through the night. Whispering at the garden wall, Talked with me from fall to fall; Mine the sand-rimmed pickerel pond, Mine the walnut slopes beyond, Mine, on bending orchard trees, Apples of Hesperides! Still as my horizon grew, Larger grew my riches, too; All the world I saw or knew Seemed a complex Chinese toy, Fashioned for a barefoot boy!

Oh for festal dainties spread,
Like my bowl of milk and bread;
Pewter spoon and bowl of wood,
On the door-stone, gray and rude!
O'er me, like a regal tent,
Cloudy-ribbed, the sunset bent,
Purple-curtained, fringed with gold,
Looped in many a wind-swung fold;
While for music came the play
Of the pied frogs' orchestra;
And, to light the noisy choir,
Lit the fly his lamp of fire.
I was monarch; pomp and joy
Waited on the barefoot boy!
JOHN GREENLEAF WHITTIER

How th



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by teaching and nursing, to build their aeroplane.

Now, when anyone does a very big, new thing, the world always wants to know how he came to do it, because that may help other people to do new things. An old man who knew the Wright broth-

ers when they were little chaps has said: "I am not surprised.

This \$2,500 trophy was given by the Scientific American for long distance (lights in heavier-than-air machines.

press. They were gentle mannered boys, honest, mod-

est, truthful, hard working, with active bodies and minds crammed full of curiosity and determination. When they began anything they finished it."

They were neither rich nor poor. Their father was a minister with a large family. They The aeroplane would be useless until it could be controlled.

What Was Going On in the Bicycle Shop

For the next eight vears the Wright brothers spent all spare their time an d money working on this problem in their little bicycle shop in Dayton, Ohio. They knew that many other men, in our own country and in Europe, were trying to get

Storms are fearful things for the aviator. This is a French air man tearing through the wind and rain at the furious rate of one hundred and thirty miles an hour. Can you tell from the picture what type of machine he is using?

the answer to that problem, too. And, oh, they were so much more likely to succeed than the Wright They had time, learning, brothers! delicate testing machines, money to build models, and powerful friends, and even governments to help them, and believe in them. The Wright brothers had only the time after work hours, no money, no laboratory and were not even well educated for their task. No one but sister Katherine and the rest of the family knew what they were trying to do, or believed that they could do it.

#### How Reading Pointed the Way

One thing kept up their courage.

By reading οf other men's experiments they came to the conclusion that everyone else was on the wrong With track. the rudest tools they made their own tests of air pressure, weight of materials, necessary spread of "wings," engine power, propellers and steering They gears. knew their aeroplane – which was a double boxkite motorair-boat—

would sail before they made it. But if Katherine Wright hadn't given her brothers all her savings they could not have built their aeroplane, and, then, as many people who know, are saying: "We would not be sailing the air today."

It was in December, 1903, at Kitty Hawk, a lonely life-saving station on the coast of North Carolina, that the aeroplane was launched, sailed and brought to earth under perfect con-Of trol. course A Surprise Wright brothers became for the Neighborn rich and famous almost They had kept so quiet at once. about what they were doing that the people of Dayton learned from the

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#### PICTURED KNOWLEDGE -

#### How Men First Tried to F

Men first tried to fly by making artificial wings which they operated by waving their arms up and down. This man has two sail-like devices attached to his body like wings, a parachute, and

#### Aeroplane Built by

The Wright Brothers built the first successful aeroplanes on this model, with two planes, one above and the other below the engine. Behind the planes in the accord-



# DEED DOCHOR KARGEN

Brown Brothers

'People felt better just to see the big, funny bear of a jolly doctor in his Bekimo clothes."

YOU know what a knight is. In old tales of chivalry, the hero put on his armor and rode away to fight bad men and defend fair ladies. After a brave deed he was knighted. The King touched his shoulder with a sword, as he knelt, and said: "Arise, Sir Knight." His title was a sort of hero medal.

Men do not have to fight in that way, today, but they battle against other kinds of evils. They spend their lives in loving service to the poor, the sick, the ignorant "Soldiers of and lonely. Painters, the Common sculptors, writers, explorers, men of science, inventors, engineers, help to make the world a better and pleasanter place to live in. In countries where there are kings,

men are still being knighted for useful, brave, and kind deeds. A few years ago a medical missionary of far away frozen Labrador knelt before King Edward of England. The King touched his shoulder with a sword and said:

"Arise, Sir Wilfred Grenfell."

Then the ladies and gentlemen of the proudest court in the world crowded about a poor doctor of fisher folk, to ask about his dangerous and lonely work. They Winning gave him money to Friends at the build two hospitals, to King's Court buy a swift steam yacht, and to get a herd of reindeer from Lapland, the only milk-giving and big draught animals that can live in Labrador. As an English knight he was able

# SOME OF THE WORLD'S HELPERS

## Burbank the Plant Wizard

This is
Luther
Burbank
himself
seated
beside
a big
spineless
cactus

Photograph by Fa. a

NCE there was a boy who loved plants. Do I mean animals! You can understand any one being fond of animals, for they learn to love those who care for them. But any florist, gardener or farmer can tell you that plants repay wise and loving The Boy care, by giving their Who wa 'Kind' to biggest, finest fruits Plants and flowers. Not so very many years ago, people thought in farming and gardening all they could do was to plow land, put in seeds and keep the weeds down. The rest was just weather and luck. So some very useful and beautiful plants dwin-

dled and pined away, because no one knew what more to do for them. Farmers said the seed "ran out." They did nothing about this until a bright boy waked them up.

It was in Lancaster, Mass., where Luther Burbank was born in 1849. Most New England boys became sailors—"far countries for

The to see," or they went to California to dig gold. At sixteen Life Luther was not strong enough to go to sea, or to "rough it" in a mining camp. He had to stay at home, and do the humdrum tasks of a poor farm. There

school. In 1856, at the age of eighteen, he came to St. Paul to clerk in a Mississippi River steamboat office. It is a big city today, with a thickly peopled country behind it, but then

it was only a struggling pioneer village "at the far end of nowhere." The Scotch Canadvouth ian worked hard all day, and studied half the night. He learned such a variety of things, and knew them so well, that he could write an encyclopedia. In his railroad building he found use for everything he knew.

### They Laughed at First, of Course!

Firewood was cheap in Minnesota, and

everybody laughed when "Jim" Hill brought a boat-load of coal from Illinois. But he sent that coal in wagons to the Red River and sold it in the Canadian town of Winnipeg. People laughed again when he bought an unfinished, bankrupt railroad, that had "crawled four hundred miles out on the prairie to die." But in six years, and that was in 1885, he was president of a good road that was making money.

#### Then Capitalists Began to Believe in Him

In that day, what wheat and

lumber came from the Northwest had to go across Canada, by the Canadian Pacific, or down to Chicago by the Northern Pacific. Mr. Hill saw how a thousand miles of

Speaking to a Gathering of Farmers

could be saved. if a road were run between these, and Puget Sound connected with Lake Superior. That would save money on the long haul to Buffalo, for water travel is cheaper than land. He made men with money believe in his plan, although neither of the other roads were making profits. Look where the "Great Northern" runs, from Duluth to Seattle, with the cities and towns

rail freight

strung along it. That road was pushed through the wilderness—through "the land of sky blue water" of Minnesota, the prairies of Dakota, along the big muddy Missouri, over wild mountains and deep canyons.

### A Line that Reached Half Way 'Round the World

When it was finished in 1893, people poured in, and wheat poured out. Lumber camps and mines were opened. Grain elevators rose like lighthouses, above the sea of grain; cattle and sheep ranged a

This picture shows Mr. Hill delivering a speech to the farmers along his lines, in which he is emphasizing the need of better farming methods.

#### James J. Hill, Scholar and Empire Builder

thousand hills and orchards bloomed in every valley. A fleet of ships had to be built on Lake Superior to carry half mila lion bushels of wheat to Buffalo every year; and a branch line pushed far up into Canada. There was a fleet on the Pacific to carry flour and cotton to China and Japan, and steamers running to Alaska.

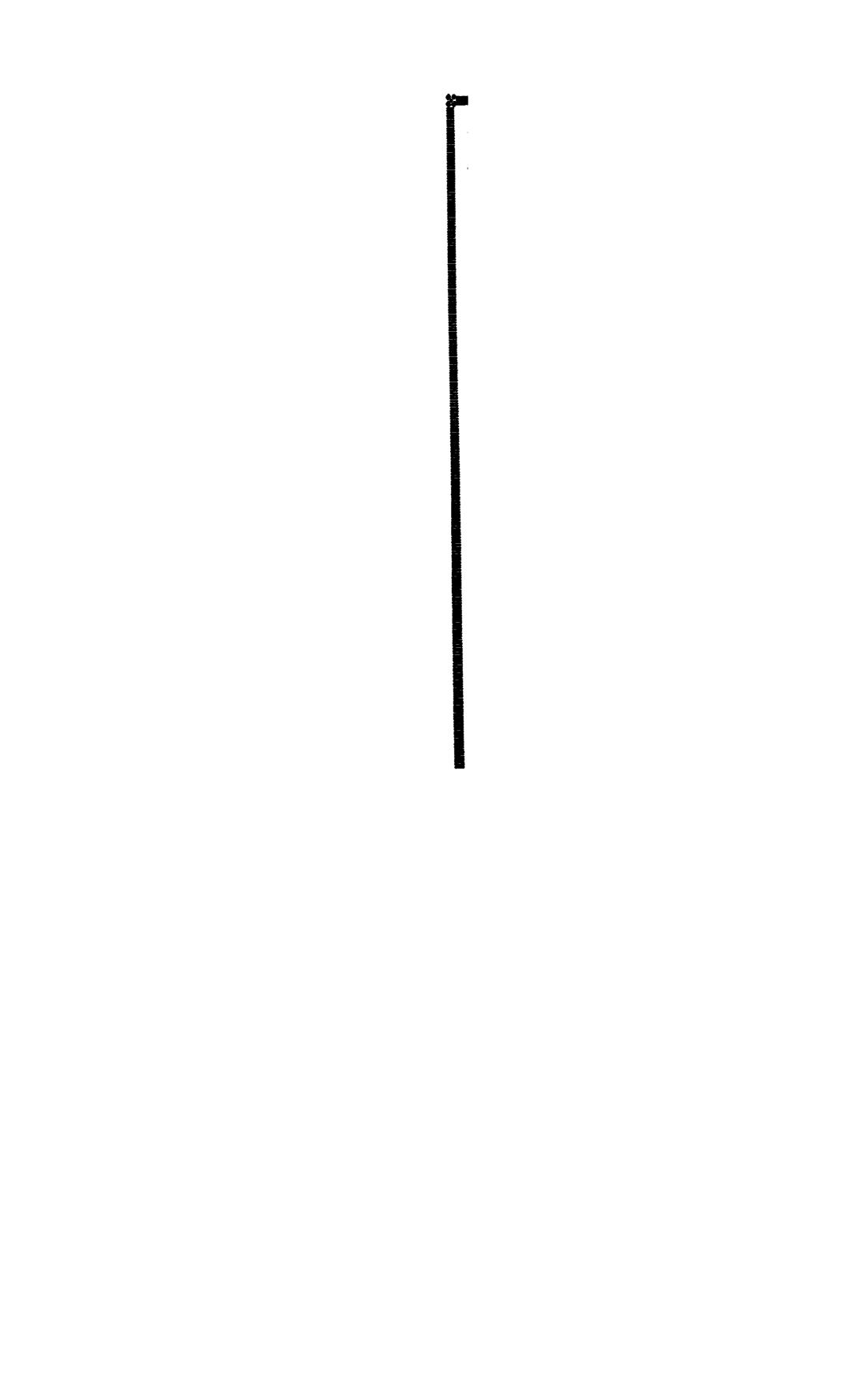
Above you see Mr. Hill as he looked shortly before receiving an honorary degree from Yale University.

And This Scotch Canadian Boy Did It All

Mr. Hill did it all. He planned the road, got the money, he built the line and he managed it. put new ideas into railroad and freight vessel building. Low grades, big engines, big cars, big boats, full loads both ways, were ideas that changed losses into profits. He got people to come into his Putting His country, and made trade Geography to Work where there was none. He knew every inch of his roadthe climate, soil, plants, animals, water, crops and people. He knew every spike and tie, bridge and tunnel and grade. He knew every man

he employed. He laid out the town sites. On a model farm he showed others how to grow wheat. Нe bought blooded animals and improved the live stock. He told people how to market their crops and invest their savings. He kept freight rates as low as possible. In St. Paul he trained young men in his ideas of railroading He trained his own sons to carry on his work.

Mr. Hill became one of our richest men, but he made new homes and good livings for "James J" Émpire millions of people. Builder added untold wealth to our country, and gave the world more bread to eat. Only a Caesar or Napoleon could show as great a record as he. But military conquerors always destroyed things and then built on the ruins. Mr. Hill tore down nothing. It was a wilderness, a waste empire, that he conquered and built up. Don't you think he deserved his nickname "Colossus of Roads?"







# SOME OF THE WORLD'S HELPERS



"Come forth into the light of things, Let Nature be your teacher."

WORDSWORTH

HIS is the story of a man who was born on a farm. And when he grew up and could have become a rich banker, he went back to a farm. Other things were more important and interesting to him than making money. Guess what they were. Birds, for one thing; squirrels, What Kept John Burwild bees; rabbits. roughs Busy sunshine and storm; woods and water; mountains, rocks, and oh-all out-of-doors, and being alive and well, and un-

troubled, and having time to think beautiful thoughts and to write them down for people to read

#### When Mr. Burroughs Was a Little Boy

Perhaps this isn't so strange, after all. In Roxbury, New York, some one was sure to be born who In the would feel like that. Romantic It lay west of the wild, Catakille romantic Catskill Mountains, where Rip Van Winkle had his strange adventure. What a boyhood his was! One of

it. abot had

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#### JOHN BURROUGHS, PROPHET OF NATURE.

it. But, you see, he cared more about a lovely Nature book that he had written—"Wake Robin."

"Birds and Poets," and "Winter Sunshine." And his books got him a nickname: "John o'Birds."

Yale University conferred the honorary degree of Doctor of Letters upon John Burroughs in 1910. Here we see him in his Doctor's robe, just after receiving the degree.

## The Beautiful "Land of Esopus"

Having bought some half wild land at Esopus, New York, between the Hudson and the Catskills, he planted a fertile field with celery and a rough hillside with grape vines. These would make enough for his famuily to live on, and give him Harvesting the leisure for Scenary writing. planted myself with my vines," he said, "and left room for the birds and squirrels." But it was from the scenery that he got his richest harvest. The rocky gorge, the forests, the ruined mill and rustic bridge, the views of mountains and river, and all the wild creatures have inspired a dozen books with such dear titles as

#### John Burroughs in His Woods

He lives in a gray and brown stone and shingle house that looks, inside and out, like a nest. His study room, called "Slabsides," is a single square room, faced with mill slabs, bowered in vines. like the trunk of an old tree. Birds Where All and bees and Nature is at Home wasps and butterflies go in and out of the open windows. The squirrels come to the sills for grain and nuts. There the nature writer watches spring come up through the woods and the snow storm draw its veil over river and mountain. He A Reporter of writes of noth-Doors" he sees and thinks and feels, and in rugged words. homely, He is not a great naturalist, but he is a very fine poetic one. He calls himself the watcher and reporter of woods and fields, of earth and sky. We know that he tells us only what is true and beauti-

ful, and he tells it in such a way as to make us love all out-of-doors with him.

Aren't you glad John o'Birds had no time to get rich?

#### All Things Beautiful

All things bright and beautiful, All creatures great and small, All things wise and wonderful, The Lord God made them all.

Each little flower that opens, Each little bird that sings, He made their glowing colors, He made their tiny wings.

The purple-headed mountain, The river, running by, The morning and the sunset, That lighteth up the sky.

The tall trees in the greenwood, The pleasant summer sun, The ripe fruits in the garden, He made them every one.

He gave us eyes to see them,
And lips that we might tell,
How great is God Almighty,
Who hath made all things so well.

-CECIL F. ALEXANDER



# Wizard Edison and His Work

& Harper & Bros.

The Boy, the Father of the Man

It is rarely that we see such a striking resemblance between a boy of twelve and the same boy at sixty-eight. It is said that genius is simply boyish enthusiasm carried through one's whole life work—and the life of Edison is a striking example.

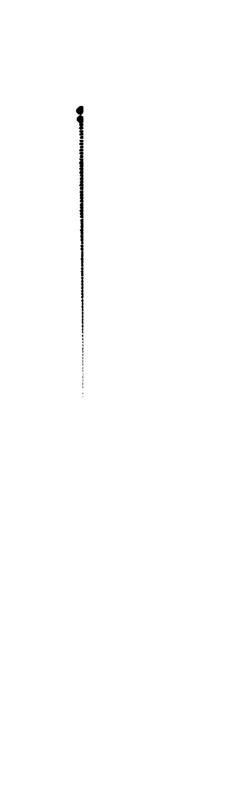
It'S hard to think of a great man as having once been a little boy, with a little boy's naughtiness and dearnesses, and a nickname, isn't it! What do you thing his mother called the great inventor when he was her little boy!

"Sobersides!"

This is "Little Mr. Sobersides"

She said he was a serious baby. He seldom laughed, because he was too busy. He watched everything with big, gray, wondering eyes, and he asked her millions of

The Busy questions that she could not answer. A Forgot to sturdy, active little fellow, his idea of fun was to get so interested in doing something that he had to be told when he was hungry and sleepy. His father had a shingle mill in Milan, Ohio, where he was born in 1847, and there was a canal



#### PICTURED KNOWLEDGE

tary, a bookkeeper, a patent attorney to file papers in Washington,—flying belts and wheels and lathes all run by electric power! There, in old clothes, with acid stained hands, and blinking like an owl if spoken to, "Sobersides" worked. Fifty inventions were going at once. At thirty he had a larger factory and had got another nickname—"The Wizard of Menlo Park." Ten years later he had his enormous plant at Orange, New Jersey Year

after year out his ma ful electrations.

> What Mr. About

"Oh, think, "was a bo

How to Be a "Born" Inventor

story of t cent lamp how long how many dollars h give us th light tha we turn of by pushin the buttor And peop laughed him when he said he was going to make an incandescent, electric lamp in a closed glass bulb. But after a while they stopped laughing, and thought "the wizard" could do anything. He invented the "talking machine," called the phonograph; the megaphone or sound magnifier that magnifies a shout on ball fields and at railway stations. Then they laughed when he said he was going to build a big house in a week by

! And he

rd to be you know. was too 7 any athe people st, made His elecric lamp alone nade him rich and ough for But he on workas ever: hen he hungry, t when and was ppy as a it a ball

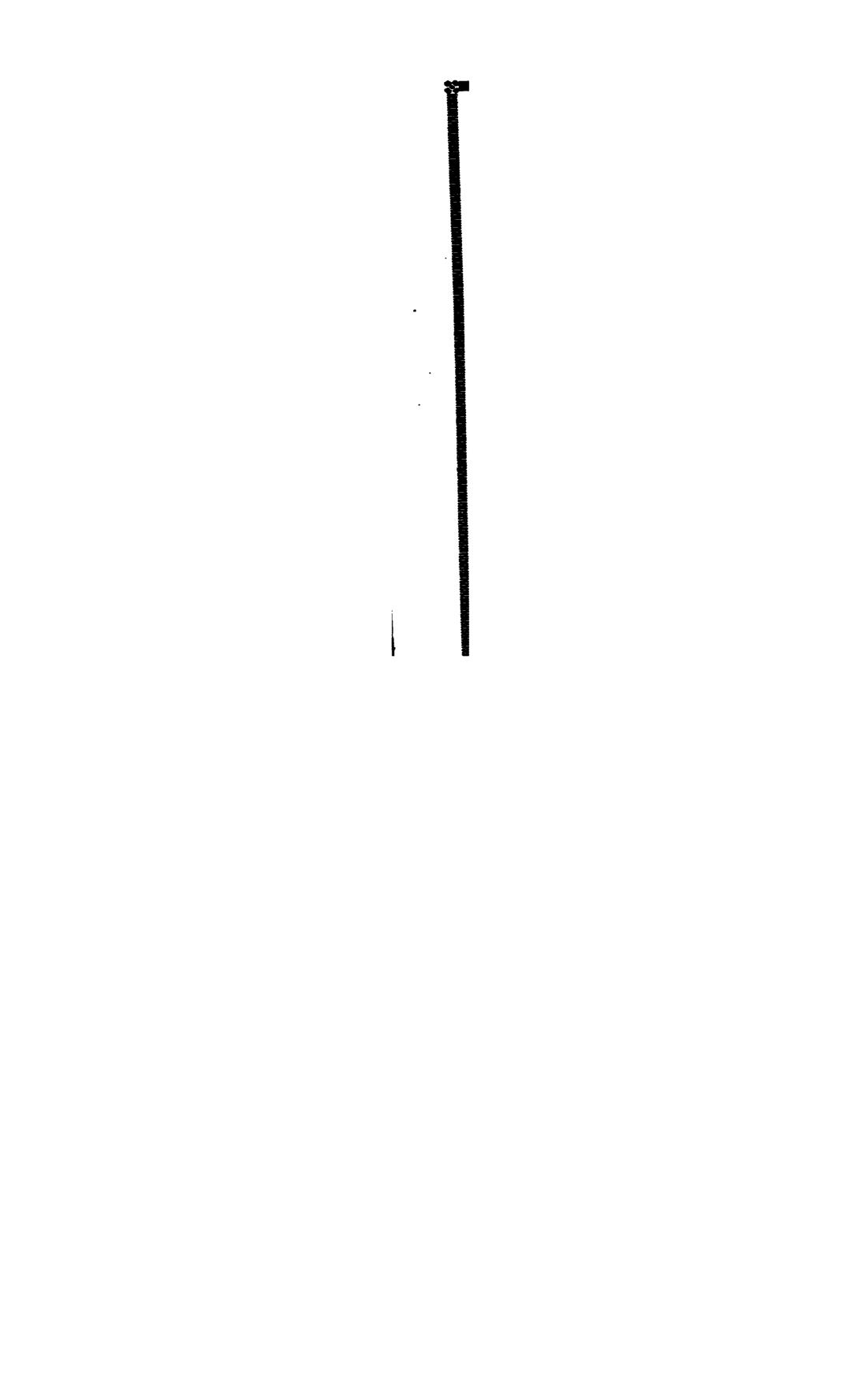
This statue, which you have already seen in Mr. Edison's library along with his dictaphone and a model of his concrete house, is by the Italian sculptor, Brodiga, and represents the triumph of Electricity over Gas.







# How "Roald" Wrote His Nam On Both Ends of the Earth



seabirds had come to land, in the spring, that Captain southern Amundsen left his winter quarters, for the eight hundred The Great and seventy-five mile Dash for the Pole march to the pole. hald five men, four sledges, fifty-two dogs and food for four months. He had to cross a wide glacier, climb a steep mountain wall and traverse a plateau two miles high. It was ten degrees below zero, and the polar plains were swept by wintry gales.

"December fourteenth when we reached the pole, and a beautiful day, bright and cold," he wrote in his diary. "We named the plateau King Haakon Land. We raised a tent that we called Pol-Passing (Polar Home), heim the Flag at the Pole planted and saluted the Norwegian flag, and floated the pennant of the Fram—Good old Fram! She has gone farthest north and south. We returned to camp in thirty-nine days, almost fat, and with eleven dogs that turned up their noses at frozen seal meat."

### A Second Discoverer of the South Pole

Captain Amundsen had captured the last prize of exploration. had been home several months when he gladly shared the glory with another man—a man who Sad Fate had failed and died. of Brave Captain Scott where he had succeeded Captain Scott of the and lived. English exploration party, had reached the South Pole too, a little later than Amundsen, but had perished on the return journey in a bliz-In his records he gave zard. Amundsen the honor of reaching the pole first. Both explorers proved to the world that no deed is as great as the brave man who dares to do it; that honor is higher than honors, and that there is human courage that no fate can daunt.

## The South Polar Regions

The ship drove fast, loud roared the blast, And southward aye we fled.

And now there came both mist and snow, And it grew wondrous cold: And ice, mast-high, came floating by, As green as emerald.

And through the drifts the snowy clifts Did send a dismal sheen:

Nor shapes of men nor beasts we ken—
The ice was all between.

The ice was here, the ice was there,
The ice was all around:
It cracked and growled, and roared and howled,
Like noises in a swound!

-SAMUEL TAYLOR COLERIDGE

# The Angel of the Battle Field

@ Brown Brether

"For Herself, She Was as Timid as a Mouse, for Others, as Brave as a Lion."

ONCE there was a very little girl, and that means one who was undersized for her age. When she spoke she "lithped," which, you know, is about the "thweeteth" thing any little girl can do; but it embarrassed her very much. She was too bashful to ask for enough to eat or to tell her mama when her Sunday gloves were worn out. She cried herself sick

over a funny mistake she made in pronouncing a word. When she grew up and taught school, the dear little children scared her.

#### But She Was Not Afraid of Battles

So, what do you suppose she did! Run away and live alone! No. She went right out on dreadful battlefields, and stood behind roaring cannon. She cared for

wounded soldiers. Many a time she had to climb on a trooper's horse and fly for her life, with bullets pattering about her like hail. For fifty years she lived amid Timid for Herself, Fear- scenes of suffering and less for Others death. You see, for herself she was as timid as a mouse; but for others, as brave as a lion.

### The Girl Who Was Born on Christmas

This little girl was Clara Barton, first president of the American Red Cross Society. She was born in Oxford, Massachusetts, on Christmas day of 1830. Babies born in that cold winter were called "Boyhood" of Člara 'snow birds. Her two Barton brothers and sisters were grown up, when she came, so she had no young playmates; but one brother taught her to ride the wild colts on the farm. A horse was one thing of which she was never a fraid. She was a "Tomboy," too, when no one was She skated with boys, climbed trees and jumped from the haymow. She loved animals and had chickens, turkeys, geese, ducks, dogs, cats and canary birds for pets. She was such a darling of a teacher, and the children loved her so, that she built up a school of six hundred pupils, in Bordentown, New Jersey. Then she went to be a clerk She read in the newspapers about Clara Barton?

Miss Florence Nightingale nursing the soldiers in the far away Crimean War.

### An American Florence Nightingale

When our own Civil War began, in 1860, she offered to do field nursing. Soon she was managing hospitals and other nurses. Before the end of the war General Butler made her "The Lady in Charge" of the military hospitals. Then, "The Lady by President Lincoln's in Charge order, she searched hospitals, prisons and battle grounds, to find missing soldiers, get those who were living, home again, and mark the graves of the dead. In 1870 she went abroad and did field work in the Franco-German war, and fed the starving in Paris, after the long seige.

In 1881 she organized the American Red Cross Society and was elected its first president. quarter of a century after that she went wherever there was Organizing suffering to relieve—afthe American Red Cross ter battle, fire, flood, earthquake and yellow fever. she never got over being timid. eighty years old and of world-wide fame, she said:

"It makes shivers go up and down my spine to address a meeting."

Don't you wish there were more in a patent office at Washington. brave little scared girls like dear

### When War Shall Be No More

Down the dark future, through long generations, The echoing sounds grow fainter and then cease; And like a bell, with solemn, sweet vibrations, I hear once more the voice of Christ say, "Peace!"

Peace! and no longer from its brazen portals The blast of War's great organ shakes the skies! But beautiful as songs of the immortals, The holy melodies of love arise.

H. W. Longfellow

# SOME OF THE WORLD'S HELPERS

# The Little Girl Who Discovered America

"I was born in the Middle Ages of ignorance, fear, and cruelty. And I have grown up in this modern world of freedom, light, and hope."

YES, I know, Columbus discovered America—the first time. But every colony that came to our new land found it again, and to each one it meant something different. To the Spanish, it meant conquest and gold mines. To the French, it meant adventure and missionary work in the wilderness. To the English, it meant new homes in a free land. And did you ever think that every foreigner who comes to us today discovers America all over again?

At the immigrant station in Boston harbor, there is a door with these words on it: "Push: to Boston." Some days it swings all day long to let in At the Door newcomers. One day, Marked nearly four hundred vears after Columbus, a little Russian Jewish girl of eleven, pushed that door open. Her dark eyes sparkled; her body quivered with happiness. Her name was Mary Antin.

"Father," she whispered, "can

no one throw mud at us? Or spit in our faces? Or soldiers push us back with guns? Or mobs break into our houses to kill and steal and burn?"

"No, Mary, none of these things will be done to us in America."

"And we can go to school without paying—even girls?"

"Yes, little one."

"Oh, dear mother, America's the 'Promised Land' of the Hebrews!" And Mary whirled her brothers and sisters in a gay dance, on the boat landing. A policeman on the corner smiled at her.

You would have thought America a land of misery and terror, had you The family been in Mary's place. was wretchedly poor, and went to live in the slums of Boston. Mary could remember when they had been well-to-do; they were even considered rich by their Russian Polotzk, Russia, In neighbors. where she was born in 1872, the mother had had a fine shop. The father had been educated for a Rabbi, or Jewish priest. Now the scholar turned peddlar, or ran a little peanut stand on the beach. Sometimes there was not enough to eat, or money for the rent in an old tenement. The only playground was a sidewalk.

But they were free and unafraid. They did not have to live "within the pale" or Jewish quarter. They were not insulted or threatened. A mob destroyed their home and shop in Russia. Stripped of all their property they had fled to America.

#### That Glorious Place, the School

It was a wonderful September morning when Mary first went to school. Their father led the five children, as though he were taking them to a religious ceremony in the

synagogue. The schoolhouse was a palace with gentle princesses for teachers. At eleven, Mary learned to At the end of a read. The Palace year she was in the and the Princess. fourth grade. In three years she finished the grammar school, and went to the Boston Latin School. When there was no money, a Russian Jew who kept a tiny grocery in a basement, filled the little scholar's glass lamp with oil. He let her have writing paper on credit. But he had no stamps. Sometimes Mary could not mail a letter at once. When she was sixteen she got a good many letters, from important Americans, for she had written a little book, in Yiddish, telling the story of her life. It was translated into English.

When she read American history, Mary wished she had lived here in Revolutionary days to fight for liberty. But there was nothing left to fight for. Her American schoolmates told her so. When she grew older she learned that this was not true. The country had changed. In Washington's time there were no big cities. No one was very rich or Now, there are many new evils to be fought—poverty, disease, ignorance, vice, dishonesty in our public service. And sympathy and brotherhood must be widened to take in all the aliens who come to our shores.

At seventeen, Mary married Mr. A. W. Grabau, a professor in Columbia University, and a Gentile. Then she entered Barnard College.

Mary's She had a little American daughter to love, and many friends. She lifted her family above poverty. Then she wrote a book that she called "The Promised Land," her name for the United States.

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